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EXAMINING IMMIGRANTS AT ELLIS ISLAND, NEW YORK

Surgeons of the United States Public Health Service test every immigrant, physically and mentally, in order to send back any who give promise of being undesirable additions to the population. New legislation, however, is much needed, to make this examination more thorough, and to exclude certain undesirable classes which the present law admits. The above photograph, from the United States Public Health Service, shows how the physical examination of aliens is conducted. The boy under the measuring bar, in the foreground, and the three immediately to the left of the desk, are examples of congenital asthenia and poor physique; two of the four were found none too bright mentally. (Frontispiece.)

WAR, IMMIGRATION, EUGENICS

Third Report of the Committee on Immigration, American Genetic Association

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THE Committee on Immigration of the American Genetic Association herewith submits its third report.

There is one vacancy in the membership of the committee, Prof. James A. Field having resigned.

A crisis has been reached in our immigration policy. The war has, for the moment, very largely reduced the flow of aliens to our shores. For the first time in many decades we have breathing space. On the other hand, the effects of the war upon the peoples from which our future immigration will come are likely to be far-reaching. This fact will, after the war is over, bring us face to face with many new and difficult problems which need careful consideration at the present time. We must think clearly, decide wisely and act quickly. We need new immigration legislation. We need it at once.

There are two aspects of immigration after the war which concern us at this moment. One is the probable future volume of immigration. The other is its probable mental and physical character.

The demoralization of industry; the breaking-up of homes; the greatly increased burdens of taxation; the desire to fly from the horrors of future wars; the widespread misery and hopelessness; the return to the United States of aliens who went home to fight and who will bring back with them many of their countrymen who have never been here—these and other causes will operate to bring us an increase in immigration which seems likely to surpass anything that we have ever known. Already plans are being made by foreign companies for the establishment of new steamship lines to bring emigrants from Europe and Asia to the United States as soon as the war is over. Prof. J. W. Jenks has pointed out that recent wars have usually resulted in a large and almost immediate increase in emigration from the European countries which were at war.

WHY MANY WILL NOT COME

On the other hand, there will be tendencies which may operate to cut down emigration from certain European countries. An enormous amount of constructive work will have to be done in the general rehabilitation of what the war will have damaged or destroyed. Immense numbers of skilled and also of unskilled workmen will be needed for these enterprises. Owing to the thinning of the ranks of the most efficient laborers, by death or by injury, during the war, wages of some classes of workmen may rise, but whether the impoverished nations of Europe will be able to compete in any general way with our American wages, and thus keep their people at home, yet remains to be seen. Again, it is not unlikely that some of the European governments will take steps to discourage, to check, perhaps even for a time to prohibit emigration. The work of reconstruction will go on most actively and most effectively in the countries of northern and western Europe, where the state and industry are well organized, and where the plans for reorganization will be carefully prepared. It is, therefore, from these same countries, from which we have in the past received our all-round "best" immigrants, that we are likely to see the greatest falling off in immigration. On the other hand, in the countries of southern and eastern Europe and of

western Asia, immigration from which has been on the whole more of a problem, because of the differences in race, political institutions, education and social habits, there will not be the same organized reconstructive work. From these countries, therefore, so largely in the more primitive condition of agriculture, the forces tending to promote emigration will be operative to a greater degree than before. Thus the great preponderance of southern and eastern Europeans, already the most striking feature in our recent immigration, is likely to be still further increased after the war is over. Balancing the reasons for a possible decrease in our immigration after the war against those which will bring about an increase, the weight of probability is strongly on the side of a marked increase.

INCREASE OF DISEASE

No one who has at heart the future of the American race can fail to view with concern the probable effects of the war upon the physical and mental condition of our immigrants. The introduction of pestilential war diseases, such as cholera, typhus, typhoid fever and the like, is not greatly to be feared, although some of our medical men are already viewing this problem with much concern. On the other hand, the more subtle and much less easily detected venereal diseases, which are always rampant in great armies in war time, and the mental breakdowns, of which there are so many thousands of cases among the soldiers at the front, present another aspect of the health problem which is far more serious.

The final report of Lord Sydenham's Royal Commission on Social Diseases (cable summary, March 2, 1916) dwells particularly upon the effect of the war upon the prevalence of venereal disease, and looks for a far more serious condition of this problem after the war is over.

Great numbers of soldiers, although not actually afflicted with any specific disease, will eventually come to the United States, maimed, crippled, wounded, enfeebled by illness or exposure, or mentally unstable. The fittest, mentally and physically; those who in the past have had the initiative and the courage to emigrate, will be dead, at the prime of life, or will be needed at home to carry on the work of rebuilding and reorganization. These are the men whom Europe will do its utmost to keep at home. The least fit are most likely to emigrate. Many of those who, because of mental or physical disability, will find themselves least able to earn a living abroad, will be the very ones most likely to be "assisted" by relatives and friends in this country to "come to America." Against the emigration of such persons the European governments will not set up any barriers. There are good grounds, therefore, for expecting, with reasonable certainty, that our immigration in the next few decades after the war will be of a lower physical and mental standard than it has been in the past.

WAR AND THE BREED

The question as to the probable effects of the war in the more distant future, upon the unborn generations, is obviously a difficult one. Opinions vary greatly in regard to it. As a rather extreme representative of one side, one may turn to Dr. David Starr Jordan's latest book, whose title clearly indicates the message which its author seeks to bring, "War and the Breed: the Relation of War to the Downfall of Nations" (1915). War, as Dr. Jordan strikingly puts it, "impoverishes the breed." The strongest and best men are the ones who are killed or injured, and who leave few or no children. The weaklings live, marry and continue the race. The result is an inevitable impoverishment of the stock. Dr. Jordan notes the reduction in the required height of French soldiers as the result of the Napoleonic wars and the killing off and wounding of the taller men. The French and German babies of 1870–71, who came to be mustered as soldiers twenty years later, were found to be an inferior lot of men. And, more recently, as noted by Dr. Jordan in *Science* (New York), a similar condition has occurred in Japan. The Japanese

children born at the time of the war between China and Japan, twenty years ago, became conscripts in 1915. According to the *Asahi* of Tokyo, as translated in the Japan *Chronicle*, the number of conscripts in Tokyo decreased over 16%. For Japan as a whole there was an increase of conscripts in 1915, but the rate of increase was only 30 to 50% of the normal. Furthermore, a lowering in the quality of the new soldiers is distinctly observable. The *Asahi* says that "most of those who underwent conscript examinations this year were born during the war and therefore are sons of those too old or too weak to go to the front, and so it is no surprising thing if the conscripts of 1915 are of exceptionally delicate constitution." This "impoverishment of the breed," in Dr. Jordan's opinion, is an inevitable result of war. The longer the conflict continues, the more serious will be the effects upon future generations. The weakling fathers—too young, too old, or too feeble to fight—and the improperly nourished, overworked and harassed mothers of Europe are handing on to their children who are now being born an inheritance of physical and mental unfitness which will mark not only this generation but future generations, through the long vista of the time to come. An increase in the number of defective children, now and hereafter, is a condition which Europe must face, and which, because it will affect the character of our immigrants, vitally concerns the United States. Dr. Ales Hrdlicka, of the Smithsonian Institution, contributes to Dr. Jordan's book an opinion as to the probable effects of heavy artillery firing on the nervous systems of soldiers in the war. He believes that subjection to the constant roar of the firing will "result in a more or less defective mental or nervous state in the progeny of such individuals."

SOME COUNTERBALANCES

Dr. Jordan's view may be thought rather extreme. The problem is a highly complex one. There are not lacking those who take a different position. It is pointed out that wars have been so constant, not only in Europe but over most of the world, that if wars do result in racial deterioration, national degeneracy should have followed them. Again, it is urged that by no means all of the physically and mentally fit who go to war are killed, or are so impaired in body or mind as to be undesirable fathers for future generations of offspring. The number and the quality of the men who will survive the war is at present an unknown and indeterminable element in the problem. Prof. Roswell H. Johnson, of the University of Pittsburgh, has recently warned us[1] against sweeping and unqualified statements that war is either good or bad in its effects on the human race. Some wars are mainly good, others mainly bad. A conscripted army is likely to be physically, and probably also in other respects, superior to the bulk of the population. The conditions of poverty, improper sanitation, and inadequate medical treatment in the homes tend toward a deterioration of the race. Many factors must thus be taken into account. In summing up his argument, Prof. Johnson says:

"In the present war it would seem that the high quality of both sides compared with the rest of the world is so predominant a dysgenic factor that, together with the other dysgenic features, the eugenic results are overbalanced. The human species therefore, on account of this, is at present declining in inherent quality faster than in any previous length of time."

In connection with this particular subject, it is highly significant that Germany, which is universally recognized as preeminently the military power of the world, and whose scientific study of military problems is so thoroughly organized, should already be giving serious attention to the racial effects of the war. On October 26–28, 1915, there was held in Berlin, a *Tagung für die Erhaltung und Mehrung der deutschen Volkskraft*—surely a highly significant designation. Over 1,000 delegates attended, and the proceedings were marked by an extraordinary unanimity of sentiment. It was recognized that "war kills the best, the bravest, the

[1] JOURNAL OF HEREDITY, Vol. VI, No. 12, December, 1915.

healthiest, eradicating once for all the finest strains of the race." There was serious discussion with a view to bringing about an increased multiplication of the fit by various means, chiefly the assistance of large families of healthy stock.

From the foregoing considerations it appears that the effect of the Great War upon the United States will, unless all signs fail, be profound and far-reaching. For it will affect the mental, physical and even moral characteristics of millions of our future immigrants and of their descendants.

PROPOSED LEGISLATION

There is a bill which passed the House of Representatives on March 30, 1916, by a vote of 308 to 87 (H. R. 10384), which, all things considered, is the most comprehensive immigration bill ever introduced into Congress. It is the result of years of careful study of our present law and of its workings. Its provisions, as the commissioner-general of immigration says in his last annual report (June 30, 1915), "contain the result of experience and investigation—of the experience of administrative officers, extending over nearly a quarter of a century, in the enforcement of various statutes regulating immigration, and of the investigations conducted variously but in particular by the Immigration Commission, created under the act of 1907, the report of which, comprising forty-two volumes, was submitted to Congress in December, 1910." The provisions of this bill "have been drawn with great care and thoughtfulness, . . . by them the law is made certain in its definitions and clear in its terms throughout—improvements badly needed in the existing statute." The bill aims to protect the United States against the incoming of mentally and physically, and of otherwise unfit and undesirable aliens. It also embodies several provisions which would insure more humane treatment to the aliens themselves, and would, to a large extent, do away with the hardships involved in the deportation of aliens who are excluded at our ports, by preventing their original embarkation.

The bill is largely a codification of our existing immigration laws, but embodies several important new eugenic provisions. Attention is here called to the more important changes which its enactment would make in our present laws with reference to the exclusion of the mentally and physically unfit. In regard to the better detection, exclusion and deportation of this group there is no essential difference of opinion among those who have the future of our race at heart. The unanimity of feeling in this matter is encouraging; but, in view of our past experience with mentally and physically defective aliens who have been admitted to this country, it is not surprising.

MORE STRINGENT MEASURES

To the excluded classes the bill adds *persons of constitutional psychopathic inferiority* and *persons with chronic alcoholism*. That many persons not properly to be certified as insane but who would, in many cases, become insane soon after arrival, could be kept out under the former provision, has long been the opinion of the physicians, the alienists and the immigration officials who have made a special study of this subject, and who have for years strongly urged the inclusion of this new provision in our immigration law. Chronic alcoholics, who are surely undesirable members of our community, are often discovered by our examining surgeons, but as the law does not now state specifically that they shall be excluded they must in most cases be allowed to land. The new bill excludes *vagrants*, and *persons afflicted with tuberculosis in any form*. It also aims to prevent the embarkation of aliens afflicted with idiocy, insanity, imbecility, feeblemindedness, epilepsy, constitutional psychopathic inferiority, chronic alcoholism, tuberculosis in any form, or a loathsome or dangerous contagious disease, by imposing upon steamship companies who bring such aliens a fine of $200 plus the amount paid by the excluded alien from his initial point of departure, provided the Secretary of Labor is satisfied that the defects could have been detected by a competent medical exami-

nation before embarkation. This is an excellent and humane provision. It would go far toward making these companies more careful in the sale of passage tickets, and would save many unfortunate aliens the disappointment and hardship of being deported after arrival at our ports. The present fine is $100, has been shown to be too small to be really effective, and does not cover as many cases as are above enumerated. A new fine of $25, plus the alien's transportation expenses, is established in cases of certain other less serious mental defects, and of physical defects which may affect an alien's ability to earn his living.

BETTER EXAMINATION

The new bill provides for a very much more thorough medical examination of arriving aliens, especially with reference to the detection of mental disease; gives the medical inspectors the exclusive services of interpreters, and suitable facilities for the detention and examination of the aliens. This amendment has been strongly urged by the united action of the most important scientific bodies in the United States which deal with the prevention and treatment of mental disease; by state medical associations, and by individual physicians all over the country. That our medical inspection has been hopelessly inadequate has long been known to the experts. We have not had enough medical inspectors, and those on duty have not had adequate facilities for their work. Thus it has come about that in spite of our law prohibiting the admission of insane and mentally defective aliens, our institutions have been filling up with just these people. As Dr. T. W. Salmon, of the National Committee for Mental Hygiene, has well said:

"There is no reason for the acceptance of a single insane or mentally undesirable alien except inability to determine his condition."

It is a very significant fact that, with the decrease in immigration since the war, particularly at New York, a more rigid medical inspection has become possible. This "intensive examination" has resulted in a marked increase in the numbers of aliens certified as having physical or mental defects. It has also resulted in increasing the percentage of the total arrivals who were debarred or returned within three years after landing from 2.6% in 1914 to 6.1% in 1915. "Certainly," says the commissioner-general, "there could be no better or more convincing argument . . . for increasing the medical force sufficiently to insure that no alien shall be admitted to the country until he has been subjected to a medical inspection really calculated to disclose his mental or physical deficiencies." With this statement all public-spirited citizens will surely agree.

The new bill extends from three to five years the period during which aliens may be deported who at the time of entry belonged to one or more of the excluded classes; who have become public charges from causes existing prior to landing; and of some other groups. This extension of the deportation period has been urged, year in and year out, by heads of institutions who have had to do with dependent, defective and delinquent aliens; by organized charitable societies, and perhaps most strongly by the former commissioner of immigration at the port of New York, Hon. Wm. Williams, whose thorough, sane and illuminating study of the whole immigration problem has contributed greatly to our understanding of the subject. It is the conviction of all the unprejudiced experts who have studied this problem that a five-year deportation period would relieve our penal and charitable institutions of an enormous financial burden, reaching into the millions of dollars, and would rid our communities of large numbers of defectives who otherwise would remain here, many of them a burden upon State or city, and many of them starting long lines of defective and delinquent children.

SAFEGUARDS FOR THE ALIEN

The new bill strengthens the provisions of existing law regarding the "White Slave" traffic; makes the inspection of steerage quarters more thorough; compels steamship companies, when

deporting aliens, to give such aliens as good quarters as those for which they paid on the voyage to this country; makes possible the expulsion from the country of alien anarchists and criminals, even when they have become such after entry; and in many other ways provides for the welfare of the alien as well as for the welfare of the United States.

All these new provisions regarding the more effective exclusion and the deportation of mentally and physically unfit aliens have been carefully drawn, as above stated, after consultation with experts who have seriously studied these particular aspects of our immigration problem. They were all suggested and strongly urged upon Congress years before the war broke out. Their enactment into law should have been effected long ago, under the usual conditions of normal immigration. But every argument in favor of this legislation has gained weight, incalculably, in view of the probable effects of the war upon the character of our future immigrants. As the commissioner-general says in his last annual report, the adoption of these amendments now "becomes an imperative necessity." It is for the best interests of our future race; it is for the best interests, in the long run, of humanity at large, to prevent, as far as may be possible, the coming to this country of the mental and physical derelicts of the war. It is unfair and ungenerous to future generations of Americans to saddle upon them the tremendous burden of supporting, not only the present generation of these people, but the long lines of their descendants. It is not doing our share in the promotion of race betterment if we, who have the matter in our own hands today, do not act at once, before it is too late.

The Committee on Immigration of the American Genetic Association heartily endorses the provisions of the pending bill which are directed towards the more effective detection, exclusion and deportation of mentally and physically unfit immigrants, and urges upon the officers and members of the American Genetic Association to make every possible effort to secure favorable action by the Senate upon this bill.

What Becomes of the "Special Class" Children?

Eugenicists have often pointed out that the costly "special classes" in public schools, for the education of pupils who are distinctly backward, are founded largely on ignorance; that many of the pupils in them are feebleminded and can never be brought up to the level of the normal child, or given effective education of the usual kind. It is therefore interesting to note the results of an investigation made by the school department of Detroit, Mich., of the records of 100 pupils from the "special classes" who had left school at 16 years of age, and who had in no case been out longer than five years. Of the 100 cases, 61 were boys and 39 girls. Their present status, summarized, is as follows:

	Girls	*Boys*
Number of children born	3	0
Married	5	0
Sexually immoral	14	0
Working	16	39
Cared for at home	15	11
In institutions	1	5
Have been arrested	4	13
Dead	1	2
No information	6	4
NUMBER OF JOBS		
None	11	12
One	9	11
Two or three	2	9
Three or more	5	23

Of the children born, two are illegitimate of known feebleminded mothers.

The eugenicists' contention that defective children require segregation instead of "special classes" appears to get a good deal of support from the above record.

EUGENICS AND AGRICULTURE

City Life Sterilizing Best Lines of Descent on a Large Scale—Population Must be Held on the Farm if the Race is to Improve—Proper Appreciation of Rural Life the Greatest Influence for Eugenics

O. F. Cook

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NOBODY questions seriously the desirability of eugenics, of taking thought for the preservation and improvement of the human race. But many doubt the advantage of measures that are being proposed under the guise of eugenics. Too much hen-roost and barnyard tends to disgust, rather than to convince the public of the utility of eugenic effort. To mate for eye-color, or to sterilize a few criminals, or to scare the responsible part of the community from marriage because of some trifling ancestral defect, do not strike reasonable people as very important steps toward the attainment of the constructive ideals of eugenics.

From a really constructive point of view we would see that much more important issues need our attention, that the preservation of the best is much more vital than the elimination of the worst. Galton and others of the more profound students of the subject have perceived this clearly but they have stopped with suggestions of subsidies for desirable marriages, or bounties for large families of desirable children, measures that are not likely to appeal very strongly to the desirable people.

To set one's self up and claim a subsidy, or to be set upon and subsidized, would be almost as annoying to a really desirable citizen as to be cast out and persecuted, which is one way to drive reformations forward. Socrates and Jesus were not only condemned but executed as undesirables. The Greeks did not follow up their persecution as efficiently as the Jews, and the disciples of Socrates were not fused into a religious community like the early Christians.

Obviously we are not yet competent to undertake the responsibility of fostering special classes or varieties of the human race, of separating the tares from the wheat. There are many kinds of wheat, and many of tares. Some of the wheat is weak and sterile and some of the tares may become valuable. Man shall not live by wheat alone.

THE IMPORTANCE OF AGRICULTURE

Vastly more important than any of the premature and doubtful issues commonly discussed as eugenics, is the relation of agriculture to the well-being of the race. A wholesale elimination of choice lines of descent is going on in our cities, a loss of good blood that must be stayed or we are undone as surely as the Greeks and Romans. The ancient prophecies of the destruction of Babylon, Ninevah and Tyre apply equally well to London and Paris and New York, and to all other places where men try to live away from the land. Man is a land animal, as the preacher of urban socialism has said, but he is also an air animal and a daylight animal, and an animal that needs to be raised in a separate family group, instead of in an urban incubator.

That one people after another, one civilization after another has culminated and decayed need be ascribed to no mysterious decrees of fate or jealousy of gods fearful of being displaced by a more perfected human race. The reason is obvious and thoroughly well known, if not adequately recognized. Each people in turn became urbanized, lost its connection with the soil and departed out of its natural environment, so that its members no longer generally attained their full development of physical strength, mental energy and social efficiency. Eugenics represents an effort on

our part to resist these tendencies to urban deterioration, to interpose another set of standards of what normal life should be.

Statistically speaking cities are centers of population, but biologically or eugenically speaking, cities are centers of depopulation. They are like sink-holes or *siguanas*, as the Indians of Guatemala call the places where the streams of their country drop into subterranean channels and disappear. It never happens that cities develop large populations that go out and occupy the surrounding country. The movement of population is always toward the city. The currents of humanity pass into the urban siguanas and are gone. Thoroughly urbanized people cannot go back and live in the country. They have no resources of mind, no adequate initiative for meeting agricultural responsibilities, no interest in the world or in themselves that enables them to support an existence apart from the crowd. They are as helpless and ill-at-ease as a honey-bee caged away from the hive, or a sheep away from the flock. Not all of the people who live in cities and towns are urbanized in this sense. Many appreciate the country all the more keenly because they are shut away from it for a part of the time. On the other hand, many have a merely sentimental interest in farm life or in the out-door world without recognizing the importance of these factors in human development.

THE EDUCATIONAL ASPECT

Agriculture is not only the basis of our civilization in the mere economic sense of affording food to support our physical existence, but in a still more fundamental, biological sense. It is only in an agricultural state that the human individual attains a normal acquaintance with his environment and a full endowment of intellectual and social faculties of this race. Wandering savages and shepherds may be strong and cunning as individuals, but in other ways they are lacking, and this is true of people raised in cities. Rich and poor alike are defective, deprived of normal existence, lacking in normal development, and unable to maintain themselves continuously, from one generation to another. It is for this reason that cities have to be recruited continually from the country. The biological fact is that the human species does not thrive in towns. The second generation is generally inferior and the third generation usually fails. A few by reason of strength of character and of family ties are able to survive longer, but even the Jews, who excel other races in these respects and withstand urban conditions better, are not a prolific or a numerous people. They have continued to exist as urbanites, but have not prospered or replenished the earth. Perhaps the promise to the seed of Abraham awaits a return to an agricultural state.

From an enlightened eugenic standpoint every child should be born and raised on a farm, in contact with the actual world of kindred, neighbors and friends, the domesticated plants and animals that represent the basis of our existence, and the wild things that live without our assistance or even in spite of our efforts to destroy them. To grow up under these conditions of family, farm and out-of-doors is necessary for normal development, in order to allow the normal human characteristics to come into expression.

A RETURN TO BARBARISM

It is obviously unreasonable to expect that children who are deprived of intimate contacts with nature or with the older generation can attain a complete development of their natural powers. The effect of the urban conditions and of the system of elaborately graded schools is to take the children out of the family group and limit their contacts largely to other children of the same age —contacts that do not make for any full development of the child in the direction of general intelligence and responsibility. The bonds of the family and other social ties are loosened and there is a real return to conditions like primitive barbarism, among our urban populations.[1]

The transmission of desirable char-

[1] Cook, O. F. Definitions of Two Primitive Social States, *Journal of Washington Academy of Sciences*, Vol. II, p. 125, 1912.

acters from the parents is not enough. In addition to the prenatal inheritance there must be a postnatal acquisition of civilizing habits and accumulated experience of the race, or children with the best blood may grow up ignorant and irresponsible, as many do. Eugenics is conceived very often in too narrow a sense, as relating merely to the transmission of desirable characters, as though this alone would solve the problems of our civilization. There needs to be a sister-science of *euphanics*, to treat of the *expression* of desirable characters, the biological factors underlying the problems of education. Eugenics without euphanics can get nowhere. The best seed is wasted unless the plants can grow to normal maturity. Breeding a crop to its highest possibilities is of little avail unless there are to be farmers who know how to give the cultural treatment that will allow the characters of superior varieties to come regularly into expression. Practical eugenics must look forward not only to the provision of normal parents and normal children, but to parents who shall be able to care for the normal development of their children.

CHILDREN NEED FARM CONDITIONS

Not to be raised on a farm is a cruel privation, a denial of the normal childhood of our race that no previous eugenic precautions or subsequent educational manipulations can make good. Many excellent and very intelligent people do not know that children need farm conditions, but it is true nevertheless, and needs to be recognized before we shall have any just or practical appreciation of eugenic or educational values. Many of our educators know how hopeless the urban children are, under the urban conditions, but they are engaged to handle such children and are doing the best they can. The urban problems are pressing and cities pay high salaries to get capable men. The result is that not only our educational institutions, but our educational ideas as well, are being cast almost exclusively in the urban mold, with no recognition of the educational value of rural life. Every year thousands of misguided parents, all over the United States, are moving to towns in order that their children may have the "advantages" of the large graded schools, the over-crowded education-factories where the city children are put through the elaborate machinery that is necessary to handle helpless humanity in large masses. The school is no substitute for the home, much less the city school for the farm home.

In cities the little children have to be sent to the school, the kindergarten, or the day-nursery, to keep them out of danger while the parents are at work or at play, but in the country where the children can be out-of-doors they do not need to be caged. The projection of urban ideas and methods of education into the country makes needless difficulties. The little children not only do not need to be sent to school, but are much better off, educationally and otherwise, if allowed to stay at home. There is no good reason why normal children of normal, intelligent parents living in the country should be sent to school before the eighth or ninth year. Nor is there any reason why any favorably situated country child should go to school for more than six months in the year. Country schools need to be improved in many ways, but running them longer is not an improvement.

It is true, of course, that many children, and especially urban children, are better off at school than at home, but that some children lack favorable home conditions does not make it reasonable to keep others from such an advantage. It would not be argued that all children should be taken away from their parents because some children are orphans, or because some parents are incompetent, careless or cruel. Yet there can be no doubt that this is very frequently the effect of our system, to make children practically orphans by turning them over wholly to the school.

PARENTS SHIFT RESPONSIBILITY

The ten-months school of the town is a concession to the convenience of parents and serves no truly educational purpose. Teachers and pupils would both be advantaged if formal tuition were limited to six months, instead of

allowing the school to develop into a separate institution apart from the life of the community. But now that the schools have assumed responsibility for the children, the parents do not want to take them back. Summer schools and all-year schools are now coming into vogue. Why should people be bothered with children for two or three months in the summer when somebody can be hired to take care of them?

Obviously this whole urban attitude toward children is not eugenic, but dysgenic. The truth is that urbanized people do not want to have children, and do not want to take care of them after they are born. They may be willing to feed or clothe them, but to look after them and have them about is too much of a responsibility, involves too much wear and tear on the overwrought parental nerves. This does not mean that urban parents are more wicked or unnatural than country parents, but only that the urban conditions are unfavorable for raising children, a fact that is generally admitted, though seldom taken into account as a basis of action.

CITY POPULATIONS SUPERIOR

Instead of being composed of naturally inferior stocks, city populations are probably superior to the residual population of the rural districts. The general tendency in each generation is for the best of the rural population, the most energetic and capable, to be drawn to the city. If city populations average better in some respects, as statisticians have claimed, this does not prove that the city is a better place to live, but only shows the more definitely that the drain of the city is a menace to the race in sterilizing and destroying the superior elements of the population. The aggregate losses are probably much more serious than those caused by war, because more general and continuous.

If the time has really come for the consideration of practical eugenic measures, here is a place to begin, a subject worthy of the most careful study—how to rearrange our social and economic system so that more of the superior members of our race will stay on the land and raise families, instead of moving to the city and remaining unmarried or childless, or allowing their children to grow up in unfavorable urban environments that mean deterioration and extinction.

Until recently cities have been distinctly in advance of any of the rural districts, not only in holding out greater inducements in the way of income, but in many other ways. Not only schools for the children, but many other conveniences, luxuries, pastimes, and amusements are supplied in cities much more easily and abundantly than in the country. But it must not be taken for granted that all of these things are as desirable or as necessary as they seem to be to people who have become accustomed to city life. Comfort should not be confused with civilization, as Disraeli pointed out. Living easily is not necessarily living well, or in a way that will give the most satisfaction to the individual or contribute most to the progress of the race. Most of the people who really want to live want to live in the country. Those who are intent upon some special pursuit of wealth or pleasure or freedom from responsibility must hold to the city as the only place to follow the courses they have chosen. But these professional urbanites are attempting to grasp a small part of life without feeling the need or accepting the resposibility of a complete existence. Certainly they do not represent the permanent nucleus or germ plasm of the race, the seed of the future that should demand the primary consideration of the eugenist.

EUGENISTS MUST GIVE HEED

That the general public, and even the scientific public does not recognize this intimate and essential relation of eugenics to agricultural habits of life, makes it all the more necessary that professed eugenists should recognize it, and should develop a constructive interest in the solution of the problems of agricultural existence.

No doubt it is possible to have a much greater share of the comforts, conveniences, social contacts, and educational opportunities that are associated in our minds with the life of the town, but it

is a mistake to suppose that rural life is to be improved only in the direction of making it more like the life of the city. To carry this tendency too far would be to lose advantages of the country and bring people all the faster to the city.

Many of the supposed limitations of the country are only fancied, and are commonly accepted as necessary only because the urban tendencies of our civilization have been so strong as to call most of the more intelligent and progressive people away to the cities. The general rule is that as soon as people get to the place where they might become constructively interested in the life and progress of the rual community they move to the city. To cure this folly a broader understanding is needed, a biological interest in life, not merely a financial or social interest. The most practical eugenists of our age are the men who are solving the problems of living in the country and thus keeping more and better people under rural conditions where their families will survive. We must learn how to establish ourselves and our families in our true places, as members of our race, nation and community, instead of allowing some shallow motive of gain or pleasure to lure us to the destruction of a sterile existence. Most of the people who are destroying themselves in cities have little more reason for it than the insects that dash themselves into the electric lights.

MUST REVERSE MIGRATION

The cities represent an eliminating agency of enormous efficiency, a present condition that sterilizes and exterminates individuals and lines of descent rapidly enough for all but the most sanguinary reformer. All that is needed for a practical solution of the eugenic problem is to reverse the present tendency for the better families to be drawn to the city and facilitate the drafting of the others for urban duty. It is not necessary that anybody be sterilized or otherwise coerced, compelled or bribed by eugenic regulations. The sanitary precautions now prescribed by some of our states may be sufficient for their purposes, which are hygienic, but not eugenic. To protect against disease and deformity is a work of mercy, and of economy for the tax-payer, but not necessarily a measure of progress for the race, if the effect is to preserve undesirable lines of descent that the natural agencies would eliminate.

Anybody who chooses to live in the city should be allowed to do so. But everybody should make the choice for himself and not be deprived of agricultural contacts or access to the land. Raising children in cities is taking a responsibility that nobody is warranted in assuming. It infringes the birthright of a normal existence and ought to be reckoned in the same general class of crimes as child-labor in factories or the starving or maiming of children by professional beggars to make them objects of pity, or the other kinds of conscious and unconscious cruelty that keep the child from a normal development.

To reach such a basis of freedom of choice of a normal existence would require many changes of our social and economic structure, and this is a part of the problem of constructive eugenics, with an enlightened interest in human welfare, to find the course by which changes may be made, so as really to improve the conditions of existence and not merely to ameliorate and make a little more tolerable the evil courses which our civilization has taken.

Socialism, the single tax and many other schemes of economic reform have been proposed in the last century, but mostly from a narrowly urban point of view. They represent efforts to improve urban conditions by a more equable distribution of wealth. The sense of justice is violated when some riot in palaces and others fester in slums. Urban reformers urge a readjustment, so that all may live in equal comfort in second-class hotels. And in order to do this they would not hesitate to destroy the very basis of rural civilization. They do not understand that the farm represents a kind of life essential to the well-being of the race, but look upon agriculture merely as one of the arts, a means of production of food commodities for the support of city populations.

Economic reforms are needed, no doubt, but it is much more important

that they be studied from the standpoint of rural than of urban interests, if the welfare of the race is to be served. Economic changes alone cannot be expected to solve the problem of urban degeneration, which has no very definite relation to the economic status of the people. From a biological or eugenic standpoint the palaces are as bad as the slums, and the middle-class neighborhoods are little better. Indeed, in some respects the middle-class children seem to have the worst of it. They do not get the wit-sharpening contacts of the newsboys and messengers, nor the opportunities of outdoor life and travel that enable some of the wealthy families to keep healthy and run along for several generations, especially when they have country places and rural conditions and contacts for several months in the year. Such familes are admittedly the cream of the city populations—the exceptions to the rule of deterioration that is generally recognized.

One important advantage that our age has over all the others is a better understanding of the fact that progress must be consecutive and evolutionary, that little or nothing is to be expected from revolts and revolutions that would destroy or change too suddenly any important or well established relation of life. No matter how good the motive or how pure the justice of any revolutionary effort, it can be no aid to true progress unless it articulates in a constructive way with actual conditions and factors that determine the course of development. With the problems clearly apprehended, the folly of revolutionary measures is apparent. It is as important to study the means of bringing the right changes to pass as to determine what the changes should be.

To recognize the relation of eugenics to agriculture does not solve the problems of our race, but it indicates the basis on which the problems need to be solved, and the danger of wasting too much time and effort in attempting to salvage the derelict populations of the cities. However important the problems of urban society may be, they do not have fundamental significance from the standpoint of eugenics, because urban populations are essentially transient. The city performs the function of elimination, while agriculture represents the constructive eugenic condition which must be maintained and improved if the development of the race is to continue.

The Non-Inheritance of Acquired Characters

It is reported that the war has put a stop to a breeding experiment with guinea-pigs, conducted in Austria by A. Wrzosek and A. Maciesza since 1907. The experiment of Dr. Brown-Sequard with these animals, a generation ago, long formed one of the pieces of evidence most relied upon by those who believe acquired characters can be transmitted through the germ-plasm. The experimenter injured the nervous system of his animals in various ways, and reported that their offspring showed similar defects. It was soon pointed out that there were other explanations of the result, which did not at all involve the inheritance of acquired characters, and most geneticists long ago ceased to attach any weight to the Brown-Sequard experiments in that connection. As they continue to be much quoted by popular writers, however, the Austrian biologists undertook to repeat the experiment and see if they could produce the same result. They failed utterly to find any evidence that acquired characters can be handed on as Brown-Sequard thought.

TESTING CRIMINAL OFFENDERS

Scientific System of Police Administration Requires That Heredity and Mentality of Persons Arrested Should Be Ascertained Before They Are Brought to Trial—New York Police Department Installs Laboratory for This Purpose—Examples of Its Work

THERE are still plenty of people to be found who think that, given a proper chance, every child will turn out well. If the child grows up to become a pick-pocket, or sets fire to an orphan asylum, it is assumed that society has sinned against him, at some time or other, by depriving him of the proper environment. If society does not actually create all the criminals, as we are sometimes asked to believe, we are at least expected to accept the idea that criminals are men and women who have deliberately or unknowingly broken some man-made law, and who, if given a stiff enough jolt in the way of a fine or imprisonment, will be brought to their senses and led to see that it pays better to walk within the limits of the statutes therein made and provided.

Such a view, more or less modified, still influences a large part of law-making, and the execution of laws. That view is based principally on metaphysical doctrines and theories of "natural rights" and the equality of man.

The way of modern science is to test these time-hallowed theories by exact observation, by classifying and measuring the facts. Criminology has undergone a good deal of this process, and the first results were a wide swing of the pendulum in the other direction. Lombroso and others put forward the idea of the "born criminal," the man who was predestined to become a murderer, or a forger, or whatever the signs might indicate. This extreme view is now largely discredited, but students of the subject nevertheless generally recognize nowadays that many persons are born with some inherent defect, which makes it impossible for them to be law-abiding citizens.

Students recognize this fact, we have said; but, extraordinary as it may seem, almost no effort has been made to take advantage of this fact in the United States in the administration of police power. There is only one police department in the United States which maintains a laboratory for the examination of adult offenders, and that is New York where, since January, a well-equipped psychopathic department has been in operation.

A PRELIMINARY SURVEY

Five or six hundred people are arrested each day, on the average, in New York City. The question of how many of these are mentally defective and irresponsible was of special interest to Police Commissioner Arthur Woods, and it was arranged that Prof. Louis E. Bisch, of Columbia University, conduct an investigation which would yield an answer to this question.

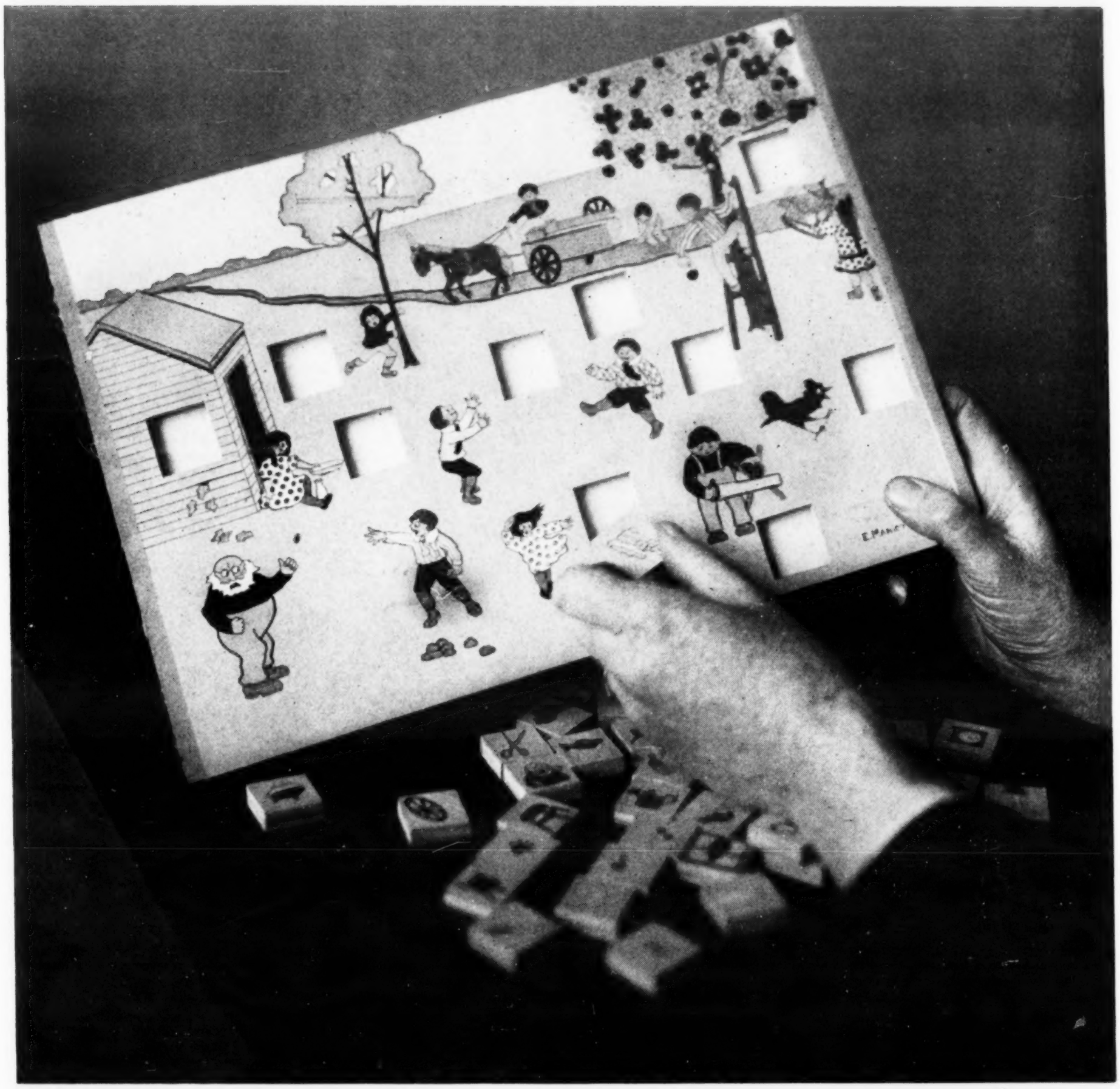
A couple of months' preliminary survey put Dr. Bisch in a position to report that, on a very conservative estimate, at least 5% of the number deserved a careful mental examination. This meant that twenty-five or thirty a day were perhaps in need of hospital rather than prison custody. Accordingly, the commissioner asked Dr. Bisch to take charge of a psychopathic department which would report on such cases.

The department headed by Dr. Bisch includes also a psychologist (Dr. E. C. Rowe) to give psychological tests; two eugenicists (William F. Blades and Dr. Harry W. Crane) to make investigations at the homes and to trace the family history; and a clerical force.

Every morning, in the New York Police Department, there is held the famous "line-up," when all the prisoners

A TEST FOR MUSCULAR CONTROL

This is one of the simplest tests applied to people who are examined in the Psychopathic Laboratory, and serves to show whether the subject can coördinate his muscular actions: whether the limbs obey the brain. It serves to show the existence of certain gross forms of organic defect. (Fig. 1.)



THE HEALEY PICTURE PUZZLE

This ingenious device has proved to be a great aid in measuring the mentality of the feeble-minded. The person examined must put in the board squares which will make the people pictured do suitable things, and this gives the examiner a chance to see whether he is able to observe and reason intelligently. Two boys in the middle of the picture, for instance, are evidently kicking a football, and the square bearing the picture of a football should be put in the opening. If the person tested puts in a picture of a cart wheel, or a pair of shears, it shows a lack of sense. Of course, the interpretation of the evidence furnished by such tests as this depends on the previous experience of the examiner, and upon a large body of normal and abnormal persons having been tested, so that the examiner knows about what a person of a certain grade of mentality should do. (Fig. 2.)

taken on the previous day, who are accused of serious offenses or who have a previous police record, are interviewed in the big gymnasium.

Judging by their appearance or their conversation, their records, or the circumstances connected with their misdeeds, Dr. Bisch selects the prisoners who he thinks are likely to be mentally deficient. They are then taken to his laboratory for examination. If they are found to be normal, they are turned back to the police officers with a statement to that effect, and prosecution follows. If they are found to be abnormal, a detailed report and diagnosis are submitted. On the basis of this, recommendations are made for

the proper segregation or treatment. The diagnoses which have been made at the laboratory include the following: Feeblemindedness, psychoses, psychic constitutional inferiority, drug addictions, sex perversions and inversions, etc.

SOURCES OF PATIENTS

Not all the cases investigated come from the "line-up," however. The lieutenants in charge of some of the police precinct stations send patients to the psychopathic department directly, if it appears advisable. The city magistrates frequently ask to have reports on some of the prisoners tried before them, before pronouncing sentence. The parole board refers many parole applicants to Dr. Bisch for examination. The courts of general as well as special sessions have taken a proper interest in this work and are sending certain prisoners to the psychopathic laboratory to be examined before sentence is passed. Another common source of subjects is a large number of people who call at headquarters insisting upon seeing the officials to ask their aid in various matters. Among these people frequently appears a so-called "crank" or person suffering from some form of mental trouble.

Often they are cases which might ordinarily escape detection for a long while. Quite recently, for example, a woman called to ask the police commissioner's aid in getting her son-in-law to support her daughter properly. Such a request seemed unexceptionable, but something in her manner aroused suspicion, and she was induced to call upon Dr. Bisch. His conversation with her indicated that she was not wholly sane, and an investigator was sent to look up her family. She was found to be living with three relatives, all unbalanced mentally, and with a child who was exposed to such a bad environment that his own mind was becoming disturbed.

A more common type of case in which the psychopathic laboratory proves its usefulness is the following: A man who wrote to a large manufacturing concern, threatening to blow up their plant unless a sum of money was paid him, was arrested and charged with attempted blackmail. Examination showed him to be insane; he really thought the firm owed him money for services rendered. He was sent to a hospital for the insane instead of to a prison.

Another case is that of a man 36 years old, found on the roof of a building and charged with attempted burglary. Anywhere else, the case would probably have attracted little attention; the man would have been convicted on a felony charge and sent to the penitentiary for at least a year, in a routine way, by a court too heavily loaded with work to give the case any individual attention. In this instance, the man was sent to Dr. Bisch, who found that he had received, years before, a blow on the head which had affected him mentally. To send him to prison would have been utterly useless; he was not responsible for his actions. Nevertheless, he talked intelligently on most subjects, had a good memory for incidents which happened before his accident, and would have been passed as normal by anyone except a trained scientific observer.

AN INTERESTING CASE

One of the most interesting cases which the laboratory has handled is that of F. B., a young man of excellent parentage, who had been brought up in a very good environment with every care and advantage which intelligence and a comfortable income could provide. He was arrested for turning in a false alarm of fire, and it was found that he had also set ten or a dozen fires which had destroyed buildings in the neighborhood. In many respects he gave the appearance of being normal mentally, but Dr. Bisch's examination showed that he was suffering from an insanity. His parents were people of good standing and superior intelligence, but the family history investigation disclosed the fact that certain other ancestors had been of a somewhat similar neurotic constitution, though their condition is not believed to have brought them before the law. Obviously this boy did not belong in prison. He was sent to a hospital for mental and nervous diseases.

F

With your pencil make a dot over any one of these letters **F G H I J,** and a comma after the longest of these three words: **boy mother girl** Then, if Christmas comes in March, make a cross right here..... but if not, pass along to the next question, and tell where the sun rises ..... If you believe that Edison discovered America, cross out what you just wrote, but if it was some one else, put in a number to complete this sentence: "A horse has.....feet." Write *yes*, no matter whether China is in Africa or not....., and then give a wrong answer to this question: "How many days are there in the week?" ..... Write any letter except *g* just after this comma, and then write *no* if 2 times 5 are 10..... Now if Tuesday comes after Monday, make two crosses here.....; but if not, make a circle here .....or else a square here..... Be sure to make three crosses between these two names of boys: George.. .....Henry. Notice these two numbers: **3, 5.** If iron is heavier than water, write the larger number here....., but if iron is lighter write the smaller number here..... Show by a cross when the nights are longer: in summer?..... in winter?..... Give the correct answer to this question: "Does water run uphill?"..... and repeat your answer here ..... Do nothing here (5 + 7=.....), unless you skipped the preceding question; but write the first letter of your first name and the last letter of your last name at the end of this line:

MANY CHANCES FOR THE INTELLECT TO TRIP

Any one who can follow all the directions on the above form, accurately and without delay, is certainly not very low in the scale of intelligence. The normal boy can do it with reasonable accuracy, but the feebleminded boy is usually hopelessly confused. (Fig. 3.)

For measuring the mentality of the people who come to it, the psychopathic department uses thirty or more tests, picking out in each instance the ones which seem best adapted to the case. In addition to the earlier forms of the Binet test constant use is made of the Stanford revision, which possibly is more suitable for use with adults. The other tests are, for the most part, well known to those whose business it is to handle such instruments. Simple questions are asked, and the subject's reasoning power and other abilities tested, not only by his answer, but by the time it takes him to evolve it. Such questions have been asked as:

"What difference would it make to people if the price of coal went up to twice what it is now?"

"Why do people send their children to school instead of making them work?"

"Which would be worst: to have all the money in the world disappear or to have all the steel in the world disappear? Why?"

One of the tests used is the Trabue Language Scale D, which is given

below. The subject is asked to write *one* appropriate word in each blank, and is given seven minutes for the task:

4. We are going_____school.
76. I_____to school each day.
11. The_____plays_____her dolls all day.
21. The rude child does not_____many friends.
63. Hard_____makes_____tired.
27. It is good to hear_____voice _____friend.
71. The happiest and_____contented man is the one_____lives a busy and useful _____.
42. The best advice_____usually _____obtained_____ one's parents.
51. _____things are_____satisfying to any ordinary_____than congenial friends.
84. _____a rule one_____association_____friends.

It does not follow that a person is abnormal, simply because he fails on this or any other single test. It is highly essential that all tests be *interpreted*, and, naturally, such evaluation should be made only by persons having a wide experience in these matters.

The "Opposites" test is one which is being widely recognized as very useful. The patient is given a list of words such as

good	outside	quick
tall	big	loud
white	light	happy
false	like	rich
sick	glad	thin
empty	war	friend

He must write down as rapidly as possible the words which mean the exact opposite of each of these. A normal person can write them almost as rapidly as his hand can move the pencil; but a feebleminded individual, even though he has spent a number of years in school, becomes bewildered at such a task.

In examining the higher levels of intelligence the manner in which the individual reacts to complicated directions is frequently suggestive. An example of such a set of instructions is given in Fig. 3.

The useful "form boards," described by Dr. Howard A. Knox in the JOURNAL OF HEREDITY for March, 1914, together with those of Healy, etc., are much employed; they require the person examined to fit blocks into their proper places in a frame. Some people insist on putting round pegs into square holes, and that in itself is significant.

The Healy pictorial completion test shown in Fig. 2 is a test for apperceptive ability. Writing with the aid of a mirror, as illustrated in Fig. 4, gives an idea of the subject's ability to learn, and of his motor-control. Memory, concentration, and other easily tested abilities are also observed, and the examiners are finally able to give an accurate judgment of whether the subject is mentally capable of holding his own in competition in the world, or whether he is so constituted that he requires special care.

INVESTIGATION OF HEREDITY

The family history is one of the most interesting and essential features of the study which this laboratory makes of its patients. The special investigators, who have made a careful study of this part of the work, visit the home of the patient, the schools he attended, his favorite resorts, etc., and not only gather data concerning his behavior, habits, peculiarities, etc., but also make special inquiries concerning the mental and physical peculiarities of the patient's brothers and sisters, parents, grandparents, aunts, uncles, etc. The report of these investigators is usually of assistance and sometimes a decisive factor in making a diagnosis of the patient's condition. It is already apparent that heredity is an important element to be considered in a study of cases of the criminal type.

"Crime," says Dr. Bisch, "should never be considered apart from mentality. Hitherto the police department has presented facts regarding evidence of guilt when the prisoner was brought before the presiding judge. Now, in addition, the department also furnishes certain facts regarding the mental responsibility of the offender. This step is a logical one and is another proof of the practical value which psychology possesses. If a man is feebleminded at his fifth conviction, he was just as feebleminded at his first

WRITING WITH A MIRROR IS HARDER THAN IT LOOKS

The boy examined is given a card with a pattern traced on it, and is asked to follow this pattern with his pencil, guiding himself solely by the reflection of the pattern in a mirror. A shield just above his hand prevents him from seeing the movements of his pencil, except by the aid of the mirror. Almost anyone finds this difficult at the first trial, but after half a dozen attempts the normal person can follow the diagram correctly, while the feeble-minded person is almost as much puzzled on the tenth trial as on the first. The test therefore aids in showing how much capacity a person has for learning, and how quickly the mind adjusts itself to a new problem, (Fig. 4.)

conviction; it will pay the community, therefore, to examine, segregate and properly treat prisoners before arraigning them, instead of waiting until they reach the court or penitentiary. The psychopathic laboratory is a huge sieve, its aim being the selective classification and disposition of the criminal population. It is not a sentimental undertaking—it is scientific, wise and humane."

The reader will probably agree with this verdict. Why, then, one naturally asks, is the criminal offender not handled in this manner everywhere?

Largely, it must be supposed, because of the lack of public knowledge sufficient to educate public sentiment. Chicago has two psychopathic laboratories for juvenile offenders, and here and there sporadic work is being done; but New York is absolutely the only place in the United States where adult offenders are examined systematically in the light of their mentality and their family history before being brought to trial.

Although only a short time in existence the psychopathic laboratory has already demonstrated beyond question that what is urgently needed is an institution for feebleminded criminals. These individuals never will be normal and it is folly to sentence, release, rearrest, and sentence them all over again as is the procedure nowadays. The criminal insane and the feeble-minded of ordinary types are fairly well cared for in some States, but the feeble-minded of criminal tendencies are a special class and should receive special segregation and training suited to the grade of mentality they possess.

German Suggestions for Constructive Eugenics

Germany continues to take an active interest in proposals for making good the eugenic loss caused by the war. An article by Dr. von Behr-Pinnow in the *Archiv für Rassen- und Gesellschafts-Biologie* (XI, 3) is thus summarized in the last issue of the *Eugenics Review:*

There are two means of increasing the population. One is by combating the causes which lead to a fall in the birth rate; the other is by keeping the death rate low. The people, beginning with school children, must be enlightened with regard to the importance of large families. The housing laws ought to be modified, hygienic homes secured for all, and every attempt by houseowners to discriminate in favor of childless couples as employes or tenants checked. Recognition ought to be given to large families by the government and expressed in a scale of wages (including supplementary payments) for all persons employed by the state, proportioned to the size of their families. The same thing should be enforced if possible (there are legal obstacles in the way) in the case of persons privately employed. Children must be discouraged from leaving their parents' home before they are of age and spending their wages on themselves alone, instead of giving a share (20%, the author suggests) to their parents; for this leads only to a decrease in the size of families. Working people can frequently be heard to say nowadays that it does not pay to have children, for in old age one gets nothing from them. The imperial insurance laws should likewise be altered in favor of married people and large families; and engaged and newly married couples must be protected (by the withholding of their names and addresses) from the flood of advertisements of contraceptives and the like which is now poured out on them. There ought also to be more stringent penalties for such advertisements, and physicians alone should be permitted to give public instruction in regard to the limitation of offspring. Infantile mortality can be decreased by providing free nurses, midwives and medical attendance to all insured women, by the payment of full insurance money for sickness during the last six weeks of pregnancy, and by granting premiums equal to one-half the sick pay for twelve weeks after confinement in winter or twenty-four weeks in summer, to all insured mothers who nurse their own children. New provisions in regard to the insurance of motherhood are also wanted, and better facilities, provided by the local government boards, for the care of infants and small children. Private societies formed for the same end and for the care of orphans must also be encouraged and assisted by the state. Funds can be raised in part by an extra tax on the unmarried and childless couples, in part by confiscation by the Government of the estates of people who die intestate and have no heirs within the third degree of succession.

"BULL-DOG" CATTLE

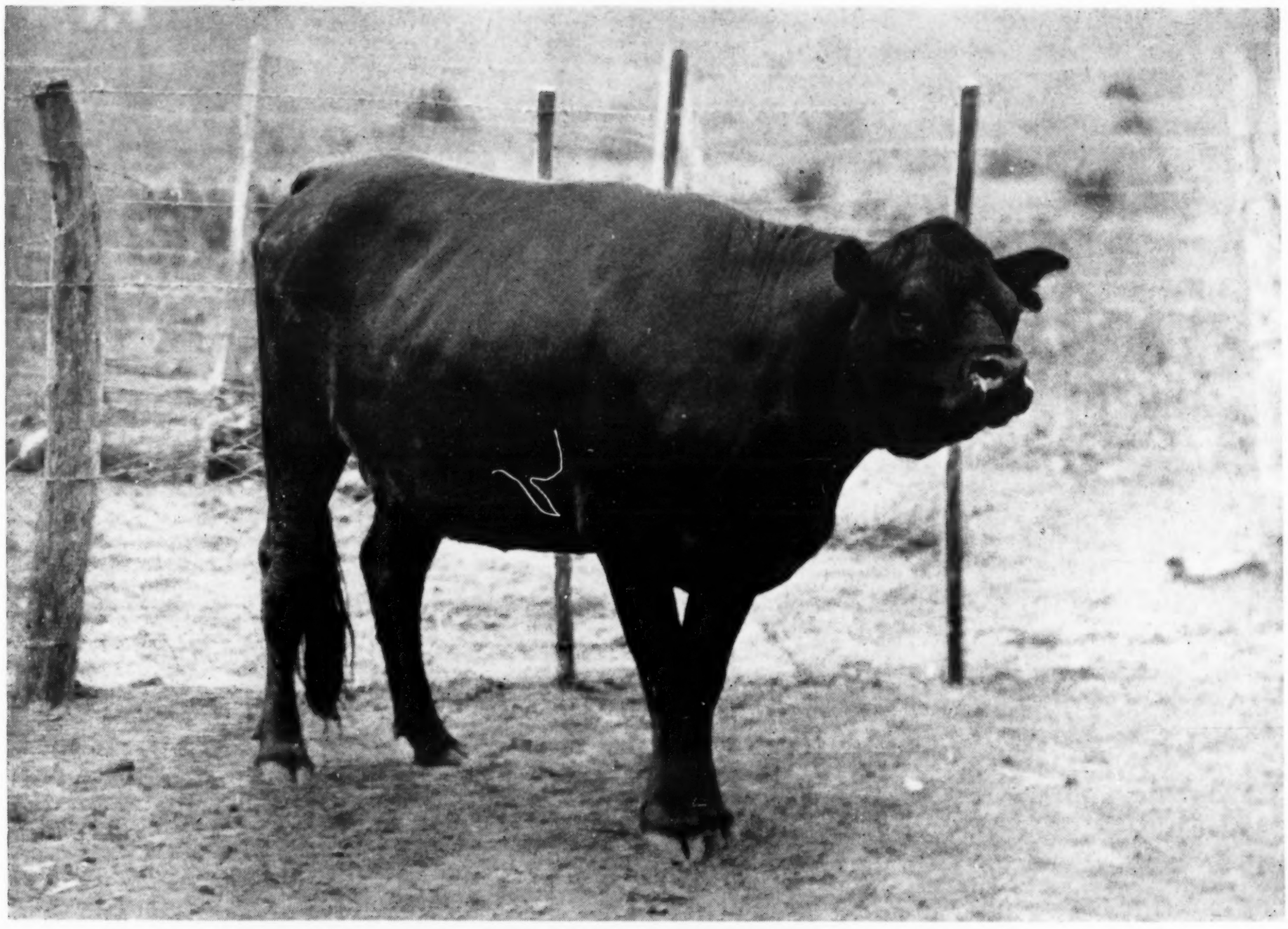
Niata Breed, Described by Darwin, Becoming Exceedingly Scarce—Presumed Mutation Accounts for Extraordinary Jaw and Face—Inheritance of Peculiarities Is Blended

THE peculiar jaw characteristic of a bull-dog is a mutation which is not confined to the dog alone, but appears from time to time in other animals. It has been reported in foxes, and Charles Darwin found a whole race of cattle in South America which showed this peculiarity. Writing of his trip through the province (now the department) of la Colonia in Uruguay, he said:[1]

"On two occasions I met with in this province some oxen of a very curious breed called ñata or niata. They appear externally to hold nearly the same relation to other cattle which bull or pug dogs do to other dogs. Their forehead is very short and broad, with the nasal end turned up, and the upper lip much drawn back; their lower jaws project beyond the upper, and have a corresponding upward curve; hence their teeth are always exposed. Their nostrils are seated very high up and are very open; their eyes project outwards. When walking they carry their heads low, on a short neck; and their hinder legs are rather longer compared with the front legs than is usual. Their bare teeth, their short heads, and their upturned nostrils give them the most ludicrous self-confident air of defiance imaginable.

"Since my return, I have procured a skeleton head through the kindness of my friend Capt. Sullivan, R. N., which is now desposited in the College of Surgeons. Don F. Muniz, of Luxan, has kindly collected for me all the information he can respecting this breed. From his account it seems that about eighty or ninety years ago they were rare and kept as curiosities at Buenos Aires. The breed is universally believed to have originated among the Indians southward of the Plata, and that it was with them the commonest kind. Even to this day, those reared in the provinces near the Plata show their less civilized origin, in being fiercer than common cattle, and in the cow easily deserting her first calf, if visited too often or molested. It is a singular fact that an almost similar structure to the abnormal one of the niata breed, characterizes, as I am informed by Dr. Falconer, that great extinct ruminant of India, the Sivatherium. The breed is very *true;* and a niata bull and cow invariably produce niata calves. A niata bull with a common cow, or the reverse cross, produces offspring having an intermediate character, but with the niata characters strongly displayed; according to Señor Muniz, there is the clearest evidence, contrary to the common belief of agriculturists in analogous cases, that the niata cow when crossed with a common bull transmits her peculiarities more strongly than the niata bull when crossed with a common cow. When the pasture is tolerably long, the niata cattle feed with the tongue and palate as well as common cattle, but during the great droughts, when so many animals perish, the niata breed is under a great disadvantage, and would be exterminated if not attended to; for the common cattle, like horses, are able just to keep alive by browsing with their lips on twigs of trees and reeds; this the niatas cannot so well do, as their lips do not join, and hence they are found to perish before the common cattle. This strikes me as a good illustration of how little we are able to judge from the ordinary habits of life, on what circumstances, occurring only at long intervals, the

[1] Darwin, Charles, "Voyage of the Beagle," p. 158 ff. New York, 1909.



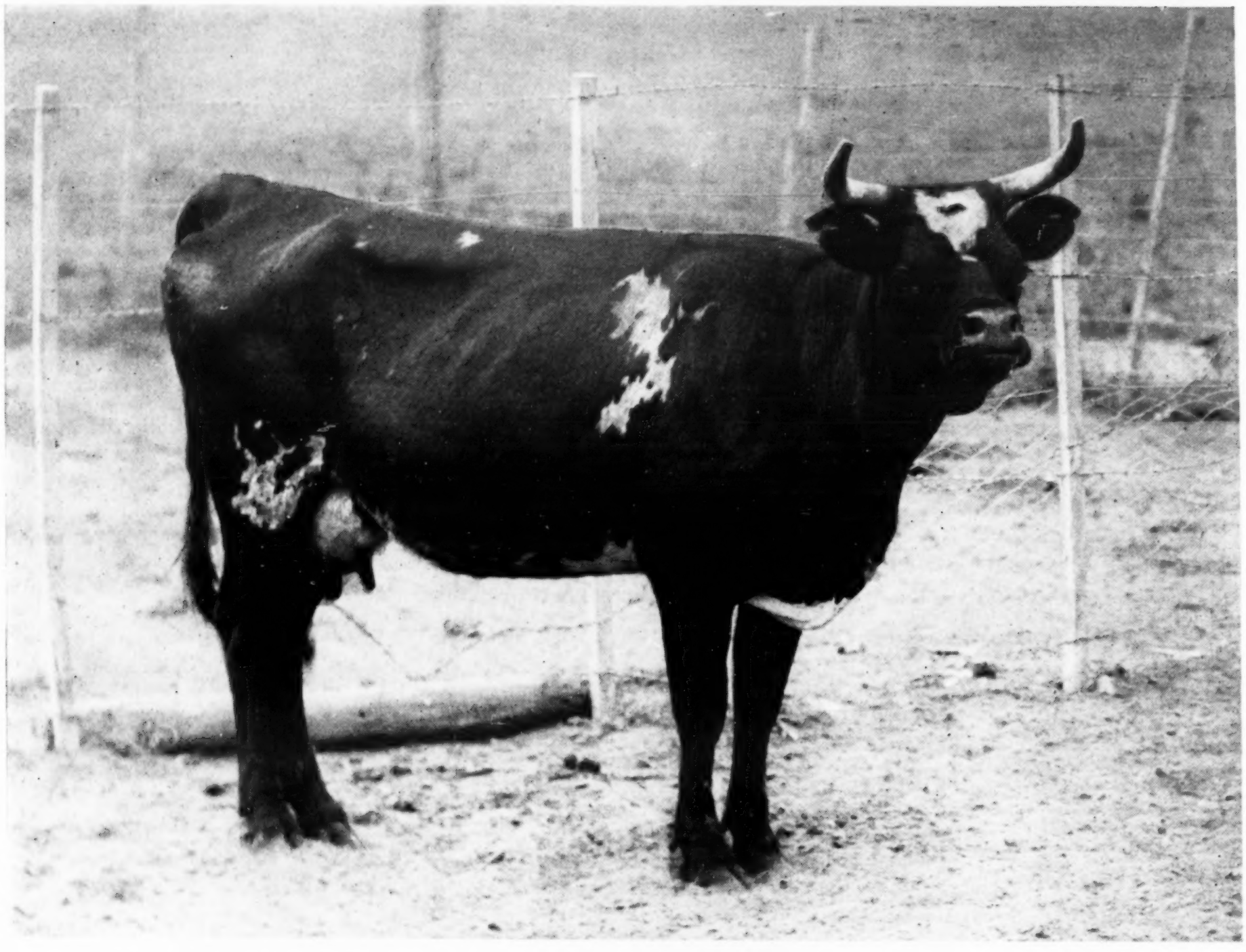
SUPPOSED REPRESENTATIVE OF THE BULL-DOG CATTLE

This cow is believed to be a hybrid, although judging from descriptions it cannot be a full-blood, ñata, the race in Uruguay which was first brought to the attention of science by Charles Darwin. It is characterized, among other peculiarities, by a short neck and upper lip, to such an extent that in many specimens the two lips do not meet. Apparently it arose as a mutation. (Fig. 5.)

rarity or extinction of a species may be determined."

Knowledge of the ñata breed has been little increased since Darwin's time and, so far as the writer is aware, no photographs of it have been published. The JOURNAL OF HEREDITY therefore undertook, nearly three years ago, to find what had become of this curious bovine race, and to secure illustrations of it. A fruitless correspondence was conducted with numerous South Americans, but finally a member of this association, B. Lorenzo Hill, of Montevideo, interested himself in the case, and for the past year has prosecuted a diligent search for information about the breed. The principal newspapers of Uruguay cooperated by printing the American Genetic Association's appeal, at the instance of Mr. Hill, and another member of the association, Don Hugo A. Surraco Cantera, Inspector Nacional de Ganadería y Agricultura, exerted himself actively in the quest. He was finally able to secure the accompanying photographs from a rancher in the district of Chubut. They were at once published in several of the most widely circulated newspapers of Montevideo, accompanied by another appeal from the Uruguayan Department of Agriculture, in which ranchers were asked to assist the American Genetic Association in getting more detailed information. But in view of the evident rarity of ñata cattle at the present day, it seems advisable to publish these photographs in the JOURNAL OF HEREDITY without further delay.

A comparison of the accompanying photographs, with Darwin's description, makes it seem probable that the animals pictured are not full-blood ñatas, but a



REMNANT OF A NEARLY EXTINCT BREED

Because of their unusual jaws, Darwin says, the ñata cattle could not pasture successfully when food was scarce, and therefore were crowded out by other types. The breed is supposed to have arisen among the Indians, but the production of high-grade Herefords and other improved breeds in Uruguay nowadays makes such an animal as the ñata no longer profitable, and it appears to have become almost extinct. (Fig. 6.)

first cross between the ñata and a common cow, for the peculiarities of the head are certainly much less than Darwin's description would lead one to expect.

The difficulty which has been encountered in finding any trace of these cattle at the present time indicates that the race has become practically extinct. Judging from the appearance of the cows, it could never have been very valuable, and the introduction of the best European breeds, particularly the Hereford, into Uruguay in recent years has raised the standard of live stock so much that, presumably, it is no longer profitable to keep ñata cattle. Add to this the possibility that the physical peculiarities of the breed have contributed to their disappearance, as Darwin describes, and it will readily be understood that their numbers might diminish greatly in the course of half a century.

Live-stock breeding has now reached such a high point in Uruguay that it is not probable that any one hereafter will care to breed such cattle as these for commercial purposes. In order to prevent the entire disappearance of an interesting variation, it would be worth while for some zoological garden to secure specimens of the ñata. Full-blood specimens, if they can be secured, would be of much value to geneticists, and ought to be fully as interesting to the public as the common stock-in-trade which every zoological garden in the world keeps on hand, with pathetic fidelity to traditions, and which every frequenter of such institutions has seen at frequent intervals throughout his life.

WHAT IS HAPPENING TO THE HAWTHORNS?

Half a Century Ago Only Ten Species Were Recognized in North America, Now There Are More Than 700—Several Lines of Evidence Indicate That Many of the New Forms Are Not New Species but Natural Hybrids

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THOSE interested in the origin of species cannot afford to overlook Crataegus, the hawthorn genus, on account of the extraordinary multiplication of species in that genus during the last fifty years. Gray's Manual of Botany in 1867 records ten species and four varieties; in 1869 his classification is the same, while Focke in Engler and Prantl's "Die natürlichen Pflanzenfamilien" gives only thirty or forty species for the whole North Temperate zone. Since 1900, however, the increase in the number of species of the genus has been enormously rapid. In 1901 Britton's Manual for the northern states west to the hundredth meridian records thirty-one species; in 1903 Small's Flora of the southeastern United States of America gives 185; in 1905 Sargent's Trees of North America, 132; while Gray's New Manual, published in 1908, describes sixty-five species and fifty varieties. In 1910 those who had discovered the new forms were N. L. Britton, eight species and two varieties; W. W. Eggleston, ten species and three varieties; C. D. Beadle, 144 species; W. W. Ashe, 165 species, and C. S. Sargent, 524 species and six varieties.

This unusual state of affairs was noticed by H. K. Brown (1).[1] In 1910 in the Bulletin of the Torrey Botanical Club (page 152), he published an account of his investigation of the subject in an article entitled "The Genus Crataegus and Some Theories of the Origin of Species." He had written to the leading authorities: C. S. Sargent of the Arnold Arboretum; C. D. Beadle, Director of the Biltmore Herbarium; W. W. Eggleston of the New York Botanical Gardens; Ezra Brainerd of Middlebury College, Middlebury, Vt., and Mr. Dunbar of the Park Department, Rochester, N. Y., and asked them a series of questions hoping to get their opinion as to the cause of the extraordinary multiplication of species in the last fifty years.

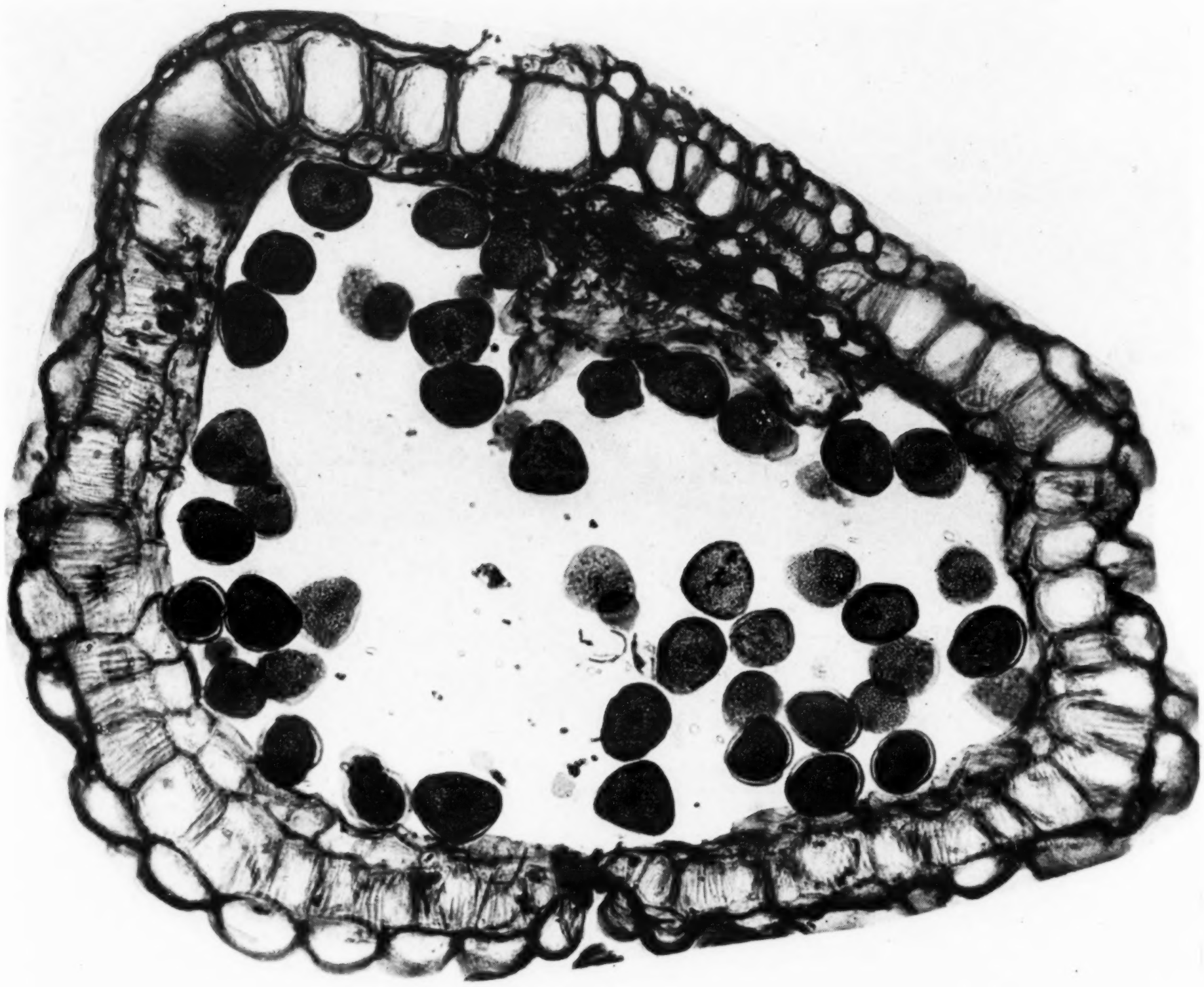
The question that headed his list was: "Why did not the systematic botanists discover the large number of species of Crataegus years ago?" The answers that he received were varied in the extreme. Sargent thought that their search was not sufficiently thorough; Ashe that they only used dry material; Beadle that their work was largely herbarium work; and Brainerd that they held in those days broader conceptions of what constituted a species.

The next question on Brown's list was: "Do you consider that the species now being described are elementary species?" The general consensus of opinion was that most of them were new species while some of them were mere fluctuations, and some were forms that have already been described and have escaped notice on account of the large numbers of new species in the genus.

SAID TO BREED TRUE

For his next question Brown asked: "Do these species breed true?" Sargent had planted over 3,000 numbers of seeds, and so far had found no evidence that they did not; the others agreed

[1] The numbers in parentheses refer to the list of authors cited at the end of this paper.



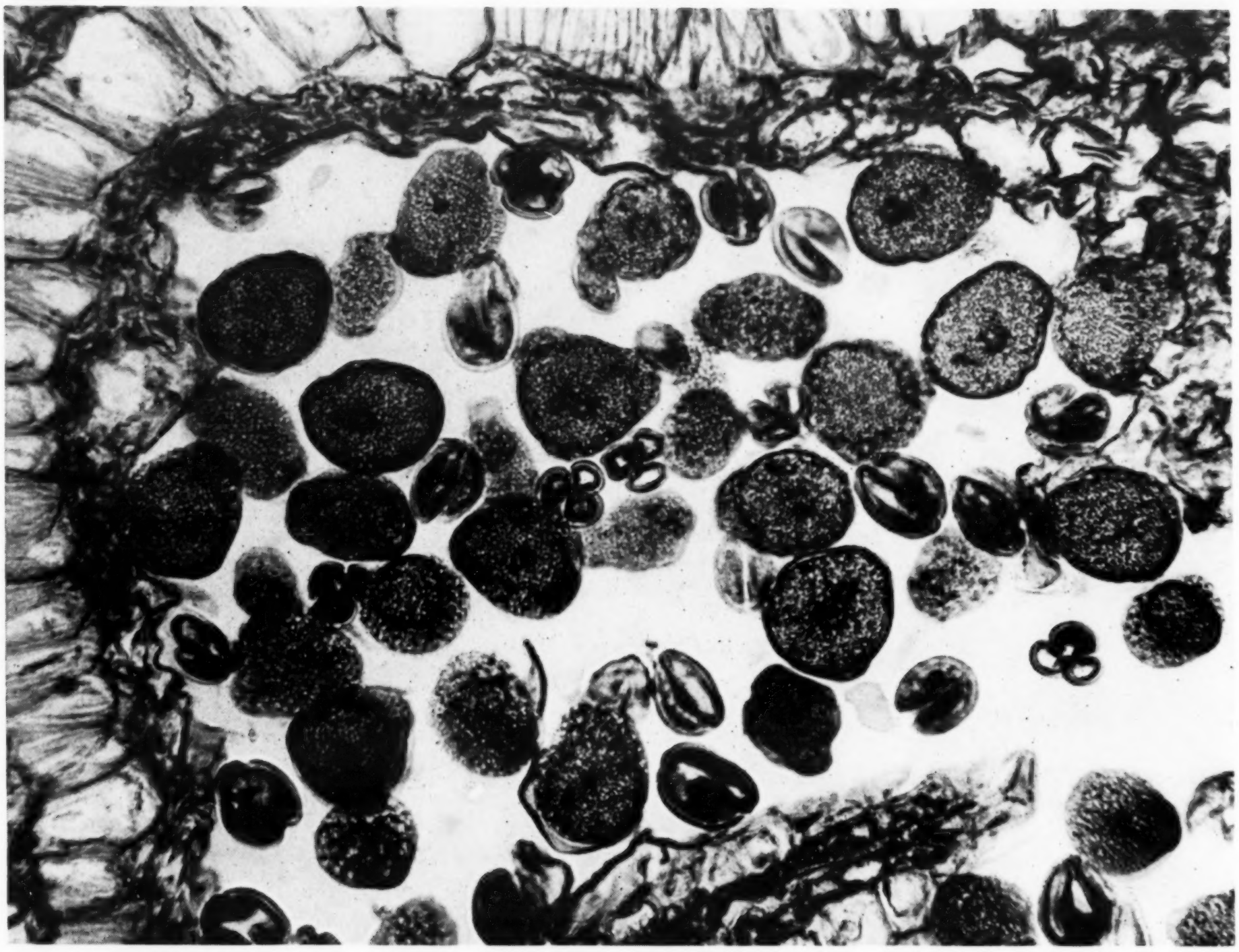
PERFECT DEVELOPMENT OF POLLEN

View of pollen sack of *Crataegus coccinea*, a hawthorn whose pollen shows no signs of sterility, practically every grain being perfect. (Fig. 7.)

that they did, although Brainerd had had no personal experience in raising them from the seed.

As to the question, "Will the different species hybridize?" Sargent had seen no evidence of it; Ashe thought that many did, and that "doubtless some of those called species are hybrids."(1). He did not think, however, that these hybrid forms were any more numerous in this genus than among the nearly related species of oaks. Beadle and Eggleston thought that they probably did, and Brainerd, although he had never hybridized any himself, knew of many cases that appeared to be natural hybrids—"local species, each quite intermediate between the supposed parents with which it is associated" (1). Dunbar had seen no evidence of hybridizing, but thought it very possible.

The last question as to whether the new species had arisen as mutations brought out extremely varied opinions. Sargent did not answer the question; Beadle thought that they had; Eggleston that some were hybrids and some were mutants; Ashe that probably some were mutants—"some of the forms in the Molles group in Missouri and Illinois would seem to be mutations leading to the inference that some of the species in this group may have originated in this manner. The variations in the Pruinosae in the Appalachians, and the localized valley species also indicate mutation origin" (1). Brainerd thought that there might be mutants, but it would be very hard to prove, and



A MIXTURE OF GOOD AND BAD POLLEN

Section of a pollen sack which may represent any one of a very large number of forms of Crataegus. Part of the grains are perfectly formed, the rest are shriveled or empty. This is the usual condition of pollen in hybrid plants, and is one indication that many of the North American hawthorns are hybrids. (Fig. 8.)

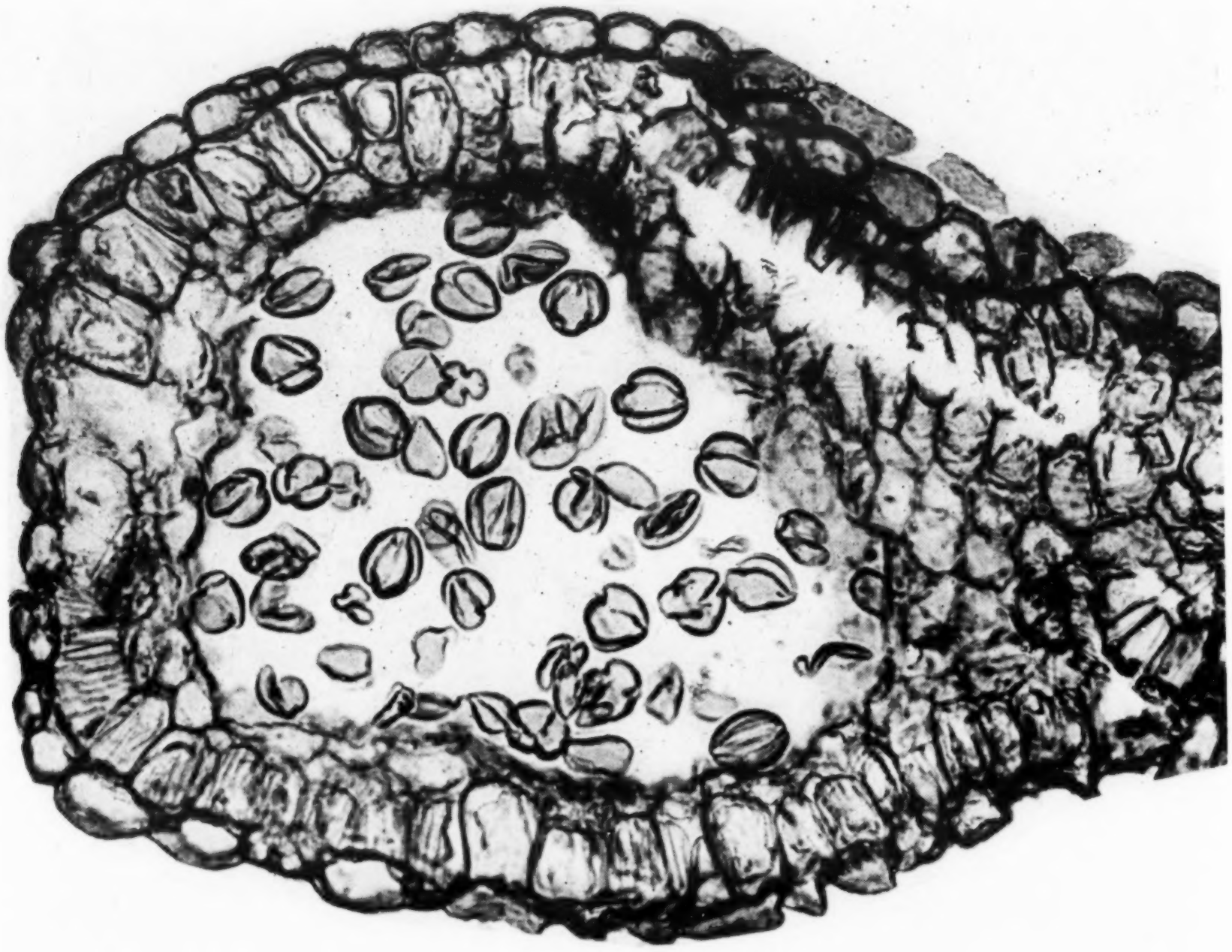
Dunbar believed in the Darwinian view of gradual change in evolution.

In the midst of so much conflicting opinion there seems to be one point on which all the authorities agree, and that is the extreme variability of the genus. Sargent alone during the last twenty years has numbered his new forms up into the thousands, and the process of multiplication appears to be still going on.

Unusual variability in plants is generally considered good evidence of hybridism, and it is more than probable that the hawthorns of the United States share with the European species in particular, and with the other Rosaceae in general, a marked disposition to hybridize. Luther Burbank has, as it were, specialized in producing variations by means of crossing; and his work, done on such a wholesale scale, is based on the principle that hybridism breaks up the continuity of inherited characteristics and results in the appearance of variations.

EVIDENCE FROM STERILITY

For further and more exact evidence we can turn to the morphological peculiarities of hybrids. Partial or complete sterility is and has long been recognized as an important basis of distinction between crosses and genetically pure species. To be sure, when the parent forms show a considerable degree of compatibility, the fertility of the offspring may be practically normal or even entirely so. Then again sterility may be largely eliminated by selection; but it is not present except when crossing is possible, it does not occur in monotypic species, and it is absent in genera that are isolated either geo-



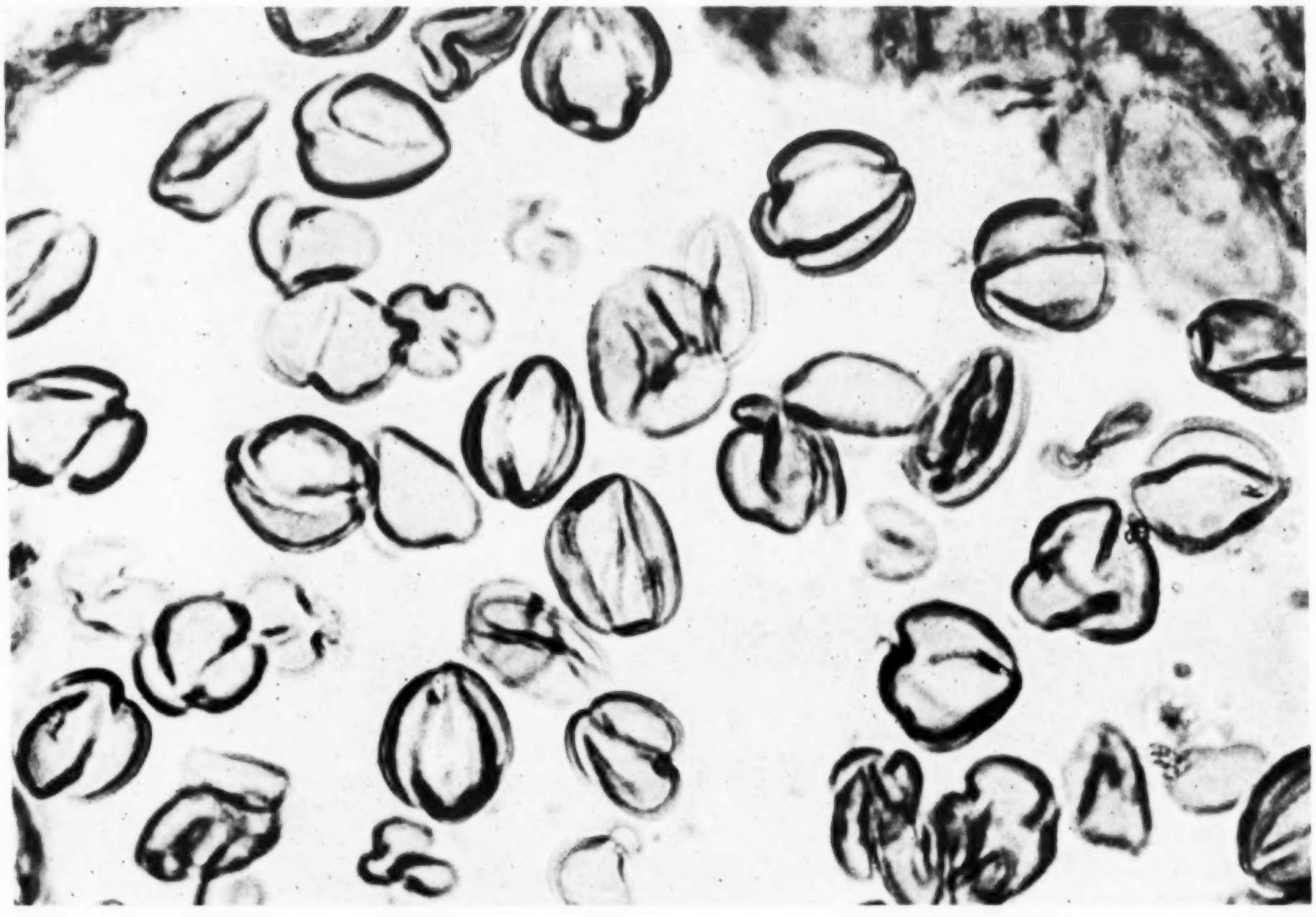
TOTAL LACK OF GOOD POLLEN

Longitudinal section of pollen sack of a hawthorn numbered 317 by Professor Sargent. Every grain in sight is shriveled or empty; there is not one which is capable of germination. Such a condition is frequently found in hybrid plants. (Fig. 9.)

graphically or phenologically (2). The sum of the evidence seems to point just one way—when absent the plant may or may not be of hybrid origin; but when pollen sterility is present, we have a clear indication of mixed ancestry.

Thus, morphologically we have a simple means of determining the purity of a species—often otherwise a difficult matter in the diagnosis of constant or relatively constant hybrids. And these constant hybrids are by no means as infrequent as we have grown to believe. Burbank's "Phenomenal," a cross between *Rubus fruticosus* and *Rubus idaeus*,[2] is as constant as the purest species (3). The hybrid alfalfa (*Medicago media*), a combination of the common purple alfalfa and the yellow *Medicago falcata*, is one of the oldest known hybrid races (3). It has been constant from the beginning as was proved when the cross was repeated by Urban. In the genus Anemone, Janczewski obtained the same results. He found that some characters would split, but that others would remain constant; and that when only such were present, hybrid races with new combinations of characters resulted which were as constant as the best species of the same genus (3). As far as I know no morphological study has been made of the pollen of these crosses, but they were quite fertile enough to reproduce themselves without any appreciable diminution in number. If found in the wild state, they would have been described

[2] This is practically the same as the loganberry, a hybrid which is now being widely grown on the Pacific Coast, and which appeared as a natural hybrid between a blackberry and red raspberry. Evidence as to whether the loganberry breeds true from seed is conflicting; certainly it does not always do so.



A BAD LOT OF POLLEN GRAINS

The hawthorn numbered "417 S. L.," seems not to have produced a single grain of pollen that was good for anything. Those shown here are all shriveled and imperfect. (Fig. 10.)

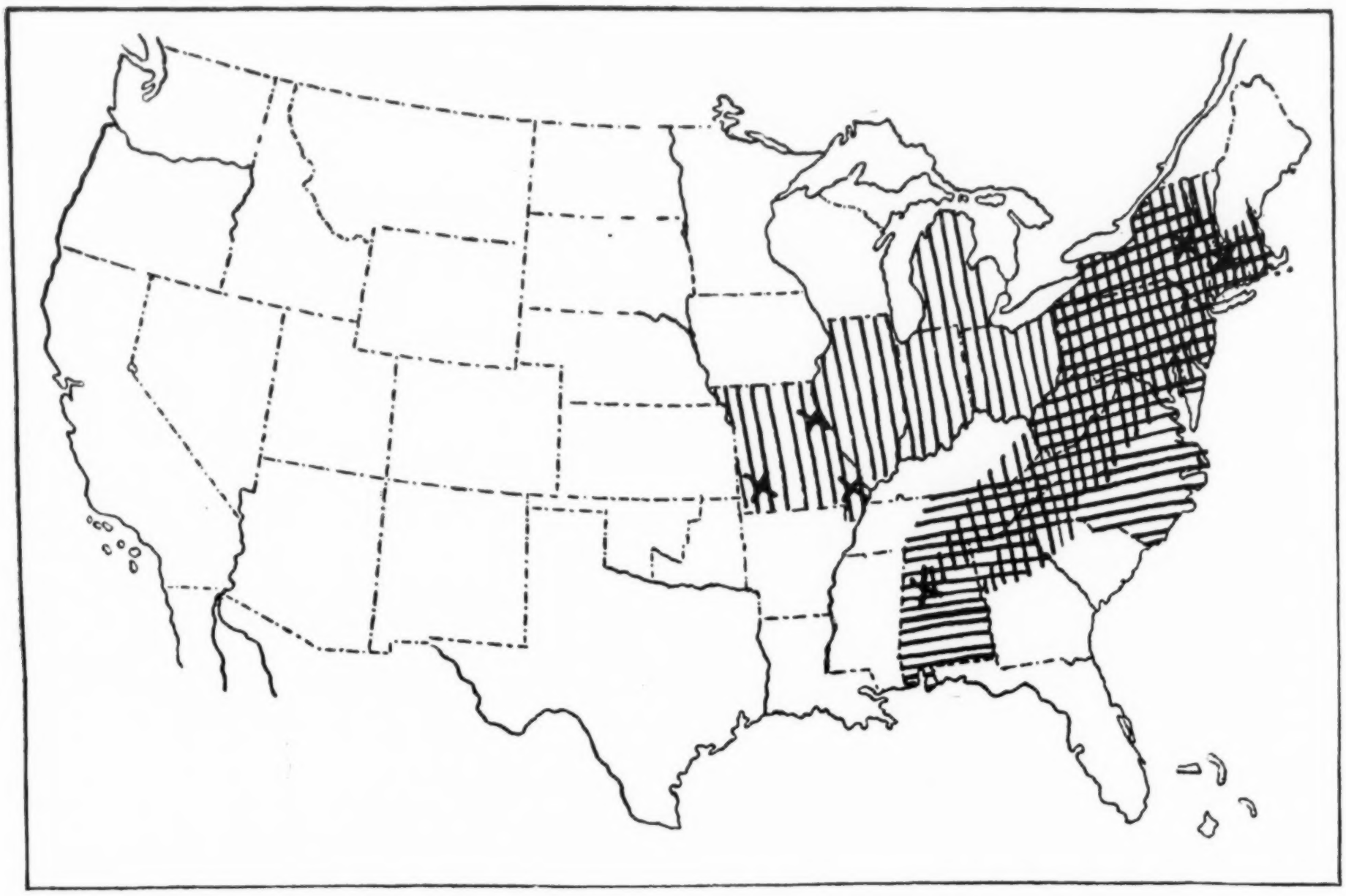
as species on a par with their parents. Such is particularly the case of the cross between *Anemone magellanica* and the common *Anemone sylvestris*.

As I have already mentioned, hybrids may have all degrees of pollen sterility from no appreciable amount to complete abortion of the grains. The hybrid *Aegilops speltiformis* is a very interesting constant race which is sufficiently fertile to propagate itself (3). It was formerly believed by Fabre and others to be a transition from some wild species of grass to the ordinary wheat—not a cross but a transition. Godron was successful in producing it artificially, however, and found it to remain constant. He discovered that although the hybrid between *Aegilops ovata*—a small weed—and the common wheat is of itself sterile and produces no good pollen, when this in turn was fertilized by the pollen of the common wheat, it gave rise to a secondary hybrid which is no other than *Aegilops speltiformis*.

Linaria italica—a hybrid toad-flax between *Linaria genistifolia* and *Linaria vulgaris* which has been repeated by De Vries in his own garden (3), is so sterile that it has to be cross-pollinated before it will give its normal yield of seed.

STERILITY AMONG THE HAWTHORNS

Among the Crataegi I found on microscopic examination that *Crataegus praeclara*—a species grown at the Arnold Arboretum, and not yet described as far as I know—is an example of complete abortion. It was found to contain no normal pollen grains. The anthers, which to all external appearance were robust and healthy, were found to be nearly devoid of contents. The anther sack or cavity was almost entirely filled up by the inner wall of cells which had apparently grown out into the sack instead of being absorbed as the pollen grains developed. As a matter of fact, the pollen grains did not develop



WHERE TWO GROUPS OF HAWTHORNS OVERLAP

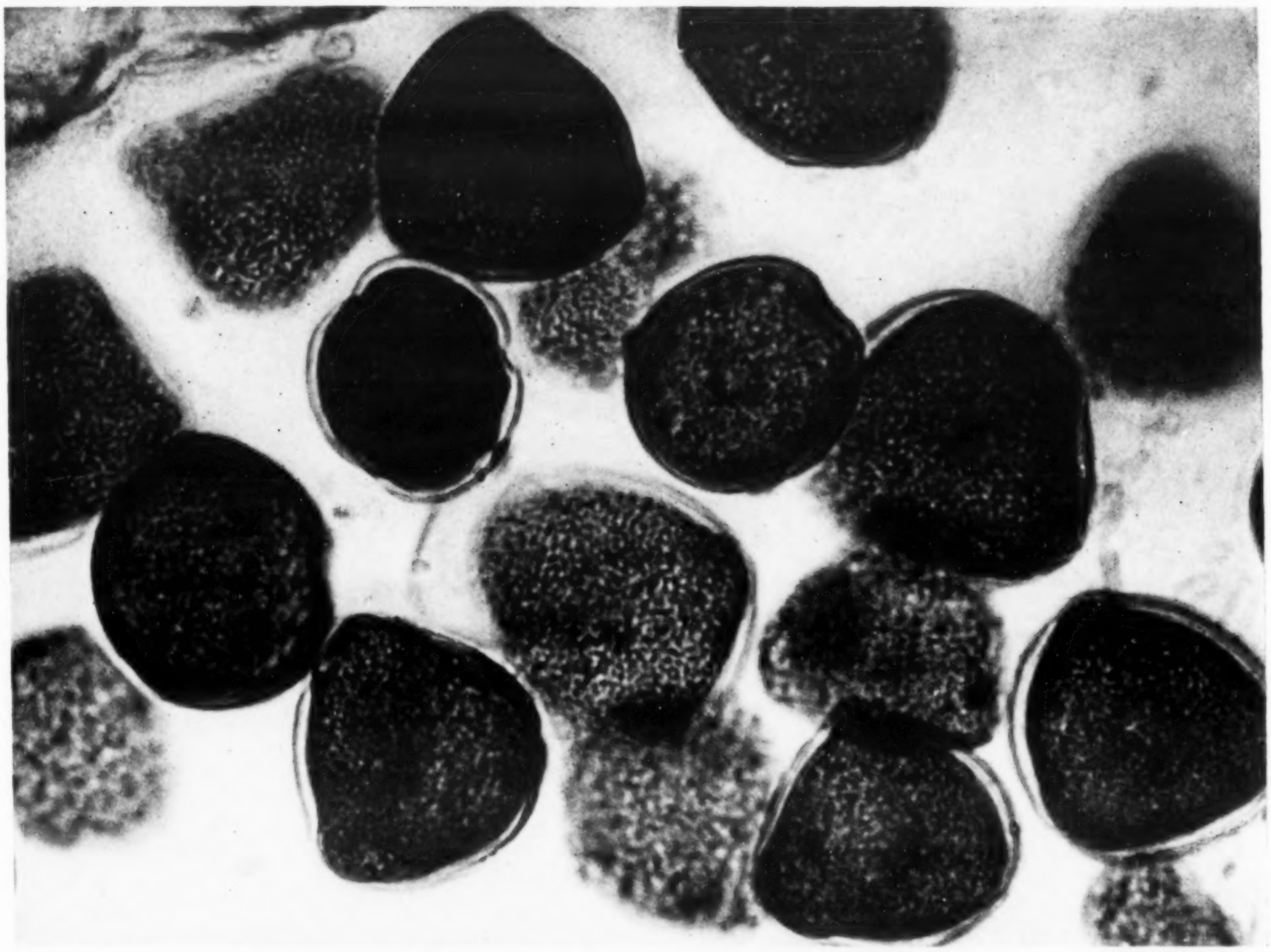
Area perpendicularly shaded indicates range of Coccineae, while area horizontally shaded indicates range of Intricatae. (Fig. 11.)

normally at all, but appeared to be collapsed and quite lacking in contents. After embedding the *C. praeclara* flowers in celloidin, and after staining the sections cut with hematoxylin and safranin, examination of the pollen grains showed them as irregularly elongated, brownish colored bodies—greatly in contrast to the triangular, opaque, and thoroughly stained normal grains that one would expect to find in a pure species. In cases of this nature, the plant must be cross-fertilized before it can propagate its kind.

Upon looking over 171 different forms of Crataegus, I found all degrees of pollen sterility. Thirty-five I classed as pure although many of them showed some grains of abortive pollen; sixty I classed as having from 10 to 50%; forty-one from 50 to 75%; and thirty-five from 75 to 100%.

As a result of an examination of the 171 specimens of Crataegus, I found the extraordinary state of affairs that roughly not quite one-fifth had normally developed pollen; while seventy-six (or within nine of one-half the total number) had between 50 and 75% sterile pollen. It is only fair to add that these species were largely among forms of such comparatively recent appearance that a considerable proportion of them have not yet been described. Out of the most sterile group (from 75 to 100%) twenty of the thirty-five species in the group could not be found in either Gray's New Manual or Sargent's Manual of the Shrubs and Trees of North America; thirty-five of the forty-one species in the next group (50 to 75%) and twenty-nine out of the group with normal pollen, had not been described in either of these manuals.

The Intricatae form one of the most interesting groups of the genus Crataegus: first because all the species of this class were once included in the Coccineae, before they were raised by Sargent to their present status; and second because an examination of the pollen of as many species as I could acquire among the two groups showed such contrasting results.



PERFECT POLLEN GRAINS, HIGHLY MAGNIFIED

The pollen grain is a single cell, enclosed in two transparent envelopes and consisting of a nucleus surrounded by nutritive material. The latter supplies nourishment for the growth of the pollen tube, down which the nucleus slips to unite with the ovule and thus start the growth of a new plant. The pollen here shown is that of *C. coccinea*. (Fig. 12.)

Gray ascribes to the Coccineae nine species and one variety of enough importance to constitute a paragraph. I was able to investigate the pollen of four forms: three of them species, namely, *C. anomala*, *C. Pringlei* and *C. pedicellata*; and the one variety, *C. coccinoides* var. *dilatata*. I also examined two more—one of which was to be found in Sargent and not in Gray, and one of which may not yet be described. These two were *C. delecta* and *C. flabellata*. I found that the pollen of all these forms was practically normal, never showing more than 10% abortive grains. I was unable to procure any of the local species of this group, but these, as can readily be seen on studying the following chart, are so situated geographically that they might easily be of hybrid origin.

Gray: Coccineae of Northeast Coast of U. S. A.

Montreal and Central Maine

1. *C. holmesiana*, south to Rhode Island and Pennsylvania, west to Michigan. In mountains to North Carolina *(var. *villipes*, south of Pennsylvania in mountains).
2. **C. anomala*, North Adams, Mass., and Albany, N. Y.
3. *C. cocc.* var. *dilatata*, south to Rhode Island, west to Missouri.

Northwest New England

1. *C. Pringlei*, south to Pennsylvania, west to northern Illinois.

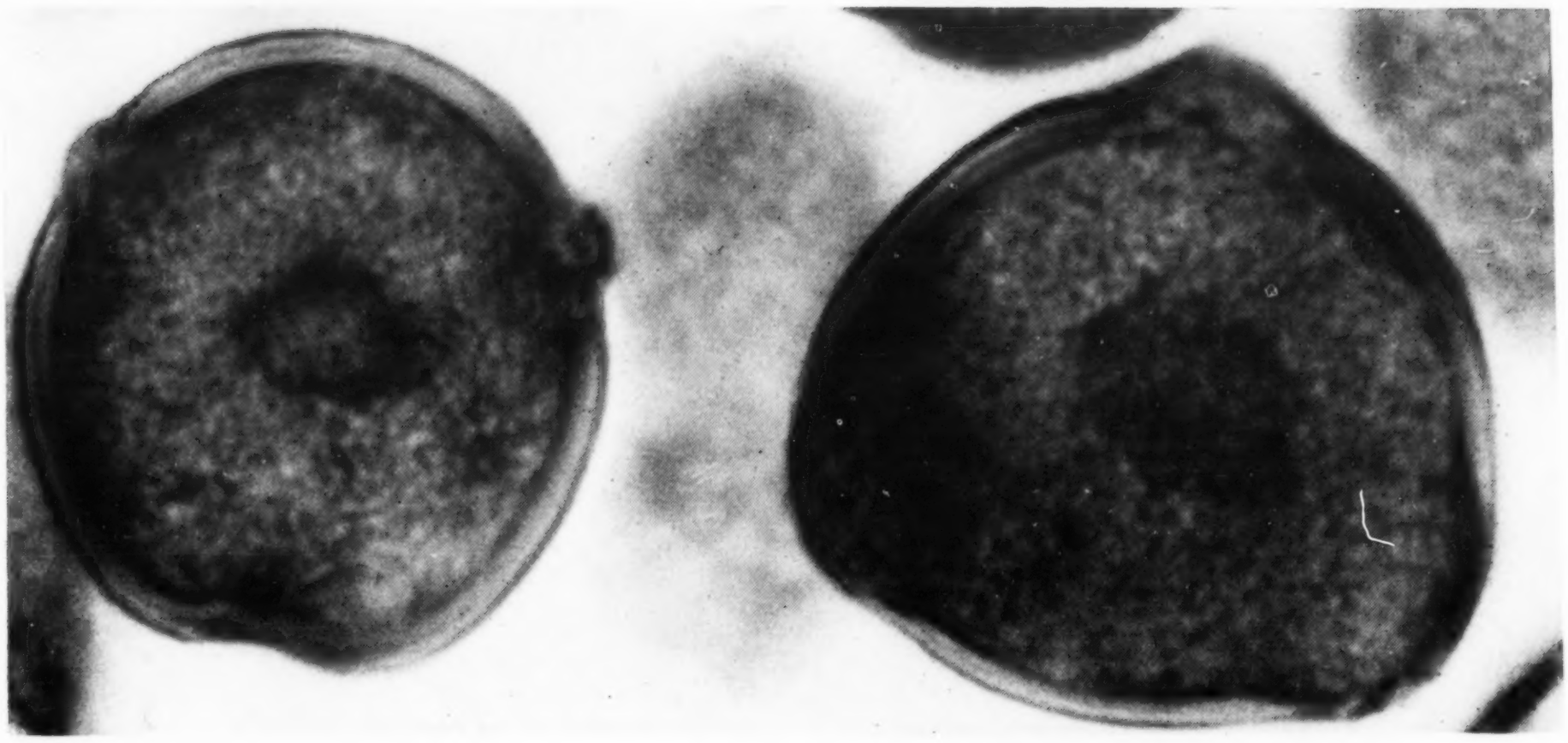
* (var. *exclusa*, Vermont and northeastern New York.)

* (var. *lobulata*, Vermont and northeastern New York.)

2. *C. polita*, south to Delaware, west to Southern Michigan.

Middle Belt

1. *C. pedicellata*, South Connecticut, south to Pennsylvania and Delaware, west to southern Ontario and northern Illinois.
2. *C. coccinoides*, southwest Indiana to eastern Kansas, southwest Indiana to eastern Kansas.



POLLEN GRAINS OF C. COCCINEA

Two complete grains of pollen are here shown, enormously magnified. The dark patches in their centers are the nuclei, which are supposed to be the carriers of most, if not all, of the heredity; surrounding the nuclei is nutritive material. It will be noticed that the outer envelope of the grain is marked by thin spots, through which a pollen tube can easily break and grow down into the ovary of the plant to be fertilized. (Fig. 13.)

Missouri

1. * *C. Kellogii*, St. Louis, Mo.
2. * *C. lanuginosa*, Webb City, southwestern Missouri.
3. * *C. pyroformis*, southeastern Missouri.

Sargent: Middle Belt (Forms Not Listed in Gray)

1. * *C. Eamesii*, Connecticut, rich, moist soil.
2. * *C. Neo-Londonensis*, Connecticut, borders of woods.
3. * *C. Hillii*, northeastern Illinois, open woods, river banks, rich, moist soil.
4. * *C. assurgens*, northeastern Illinois, open woods, river banks, rich, moist soil.
5. * *C. acclivis*, northeastern Illinois, banks of rivers at Rochester and Niagara.
6. * *C. delecta*, northeastern Illinois, open pastures and wood borders.
7. * *C. sertata*, northeastern Illinois, open woods, rich, moist soil.

Note: Forms marked (*) are of purely local distribution.

The forms of the group as a whole are seen to be either of extremely wide range of distribution or they are extremely local; and these local forms never occur in an area not already covered by two or more of their more cosmopolitan cousins. These facts I consider significant. It is also of interest to note that all the new species recorded in Sargent but not in Gray and belonging to this group are confined to purely local distribution—two in Connecticut, and five in northeastern Illinois. I venture to guess that if the pollen of these forms were to be investigated, it would show a high percentage of sterility.

Examination of the pollen conditions of the Intricatae, on the other hand, proved them to be surprisingly sterile. Gray ascribes to the group six species and one variety. Of these seven forms I have investigated five:

C. Boyntoni.
C. foetida.
C. coccinea L.
C. apposita.
C. apposita, var. *Bisselli.*

Sargent describes three more forms not mentioned in Gray, and of these I was able to ascertain the pollen conditions of two:

C. Buckleyi. *C. venusta.*

Thus of the ten different forms that make up the Intricatae, I have looked into the spore conditions of seven and in no case have I found a flower that is not strikingly sterile. I was able to examine the pollen of one of the two extremely local species of the group—*C. venusta*, which is confined to the open oak and hickory woods on the dry

FEW GOOD, MANY WORTHLESS

Crataegus No. 367 S. L., showing a few perfect (dark) pollen grains and many shriveled (light), imperfect grains. Such a condition is regularly found in a great many plants of hybrid origin. The assumption is therefore worth testing, that the hawthorn which produces these is a hybrid and not a real species. (Fig. 14.)

slopes of Red Mountain in the southern part of Birmingham, Ala.—and I found it to be about 75% abortive. It is of interest to note among the Intricatae as well as among the Coccineae that the extremely local species only occur in localities already covered by other members of the group, and the same characteristic of overlapping in the range of distribution is evident.

Distribution Chart of the Intricatae: Gray

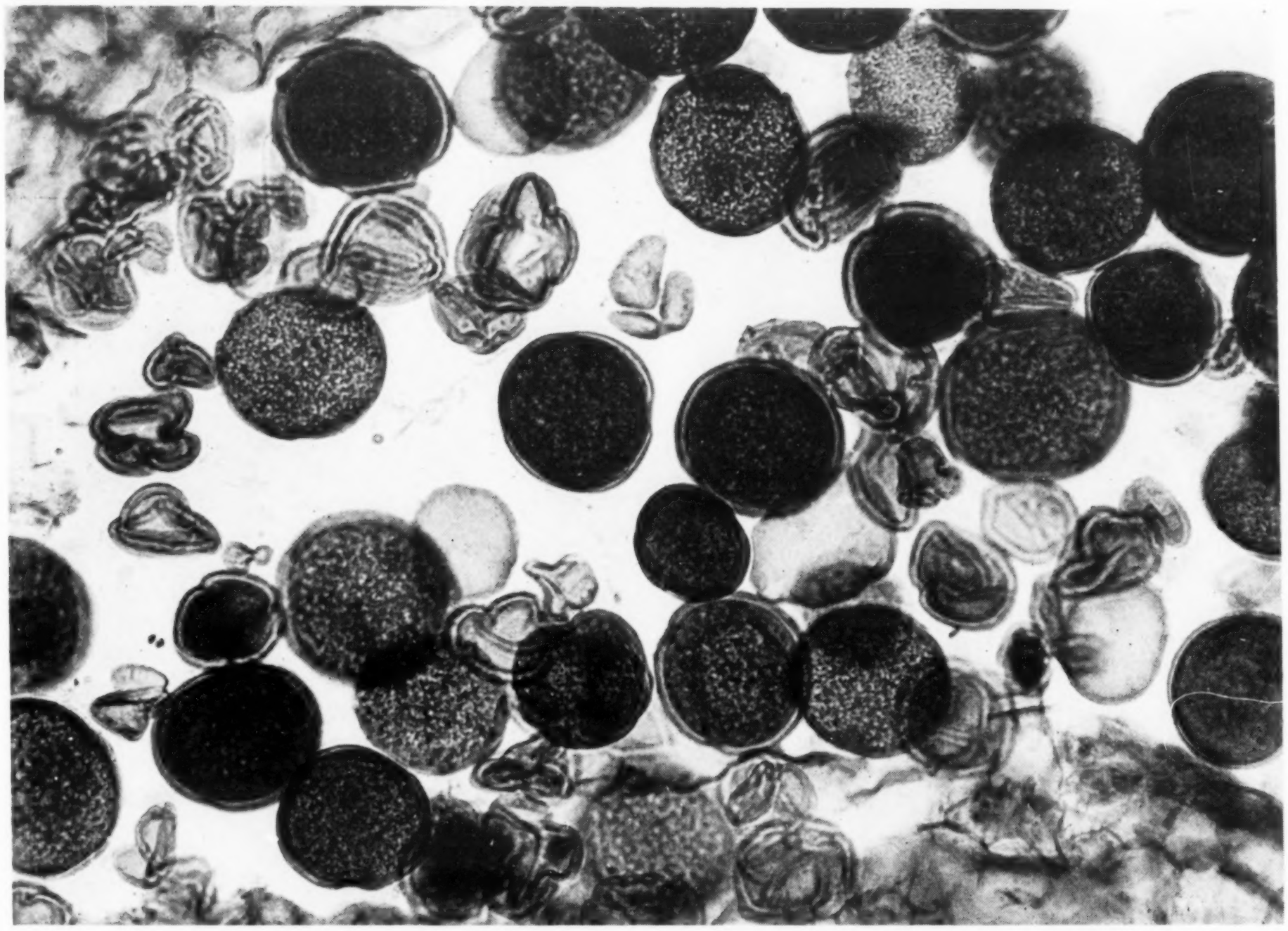
1. *C. coccinea* L., eastern Massachusetts to southwestern Vermont, southeastern New York, Pennsylvania, North Carolina, rocky woods.
2. *C. apposita*, Massachusetts and southwestern Vermont to New York, Virginia, rocky woods.
3. *C. apposita*, var. *Bisselli*, Massachusetts and southwestern Vermont to New York, Virginia, woods.
4. *C. Boyntoni*, Tennessee, Virginia, North Carolina, mountain woods.
5. *C. biltmoreana*, Virginia, North Carolina, mountain regions.
6. * *C. Stonei*, Central Massachusetts to Albany, N. Y.

Intricatae: Sargent (Forms Not Listed in Gray)

7. *C. Buckleyi*, Tennsessee, Virginia, mountain slopes.
8. *C. Sargenti*, northern Georgia, southern Tennessee, Alabama, woody bluffs.
9.* *C. venusta*, Red Mountains, Birmingham, Ala., woody slopes.

By means of the accompanying map (Fig. 11), I have tried to diagram the distribution of the Coccineae and of the Intricatae. The areas attributed to each group are bounded by the extreme limits of the various species in the group; while the local species I have indicated by crosses.

Although the map cannot bring out the overlapping of different species within the separate groups, it does show



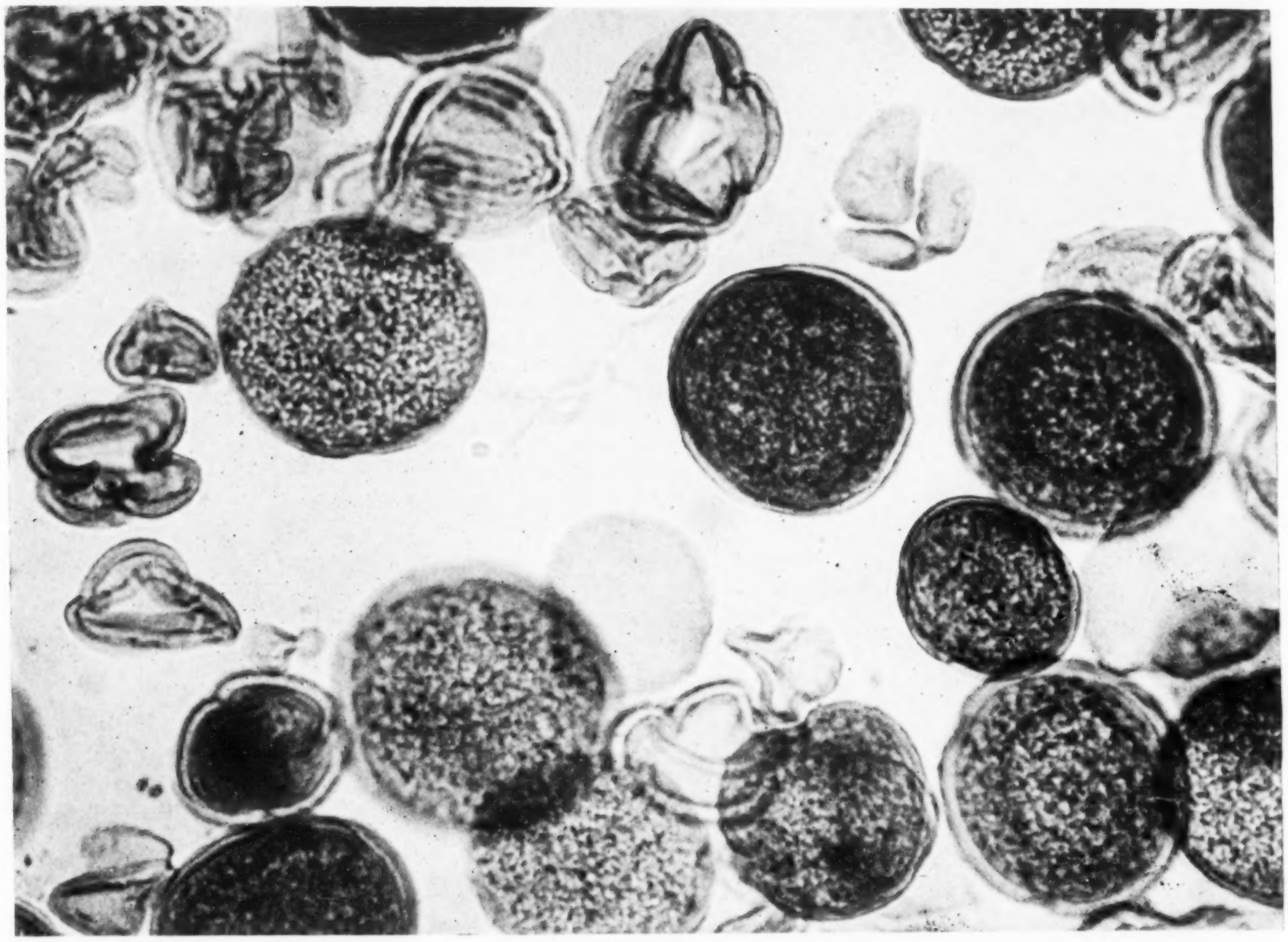
THE POLLEN OF CRATAEGUS HARBISONI

Perfect and imperfect grains seem to be present in about equal numbers. Although *C. Harbisoni* has been described as a good species, the condition of the pollen reminds one of such cases as the Velvet Bean artificial hybrids, where exactly one-half of the pollen was worthless. There is reason to suspect that "*C. Harbisoni*" and many other supposed species of hawthorn are not species at all, but natural hybrids. (Fig. 15.)

the overlapping in distribution areas of the two large groups. Massachusetts, southern Vermont, Connecticut, Rhode Island, New York, Pennsylvania and Delaware are states common to both the Coccineae and the Intricatae, as are also the mountainous regions south through Virginia, North Carolina, Tennessee and northern Georgia and Alabama.

It seems to me highly probable that the Intricatae—this group of comparatively new species which are also so closely allied to the Coccineae that the older systematic botanists included them under this last heading—may have an even closer relationship with them. Pollen sterility is a generally accepted characteristic of hybrids, and the Intricatae as a whole appear to share this trait with them. If crosses could be worked out with different species of the Coccineae for one or both of the parents, it would not surprise me if most of the Intricatae could be artificially produced. This, however, would be a long and tedious experiment owing to the years of maturation necessary before the hawthorns can bear seed. Nevertheless, from whatever stock the Intricatae may have sprung it seems to me very significant and a fact worthy of further study that the group as a whole is marked by such an extreme degree of sterility—a degree which is unusual even for the genus Crataegus.

The fact that *C. venusta* occurs only in the open oak and hickory woods on the dry slopes of Red Mountains near Birmingham, Ala., made the form of sufficient interest for me to look up the other forms of Crataegus which were native to the state. I found that in Alabama alone there were described in Small's second edition of his Manual of the Southern States, sixty-four species



THE POLLEN OF CRATAEGUS HARBISONI

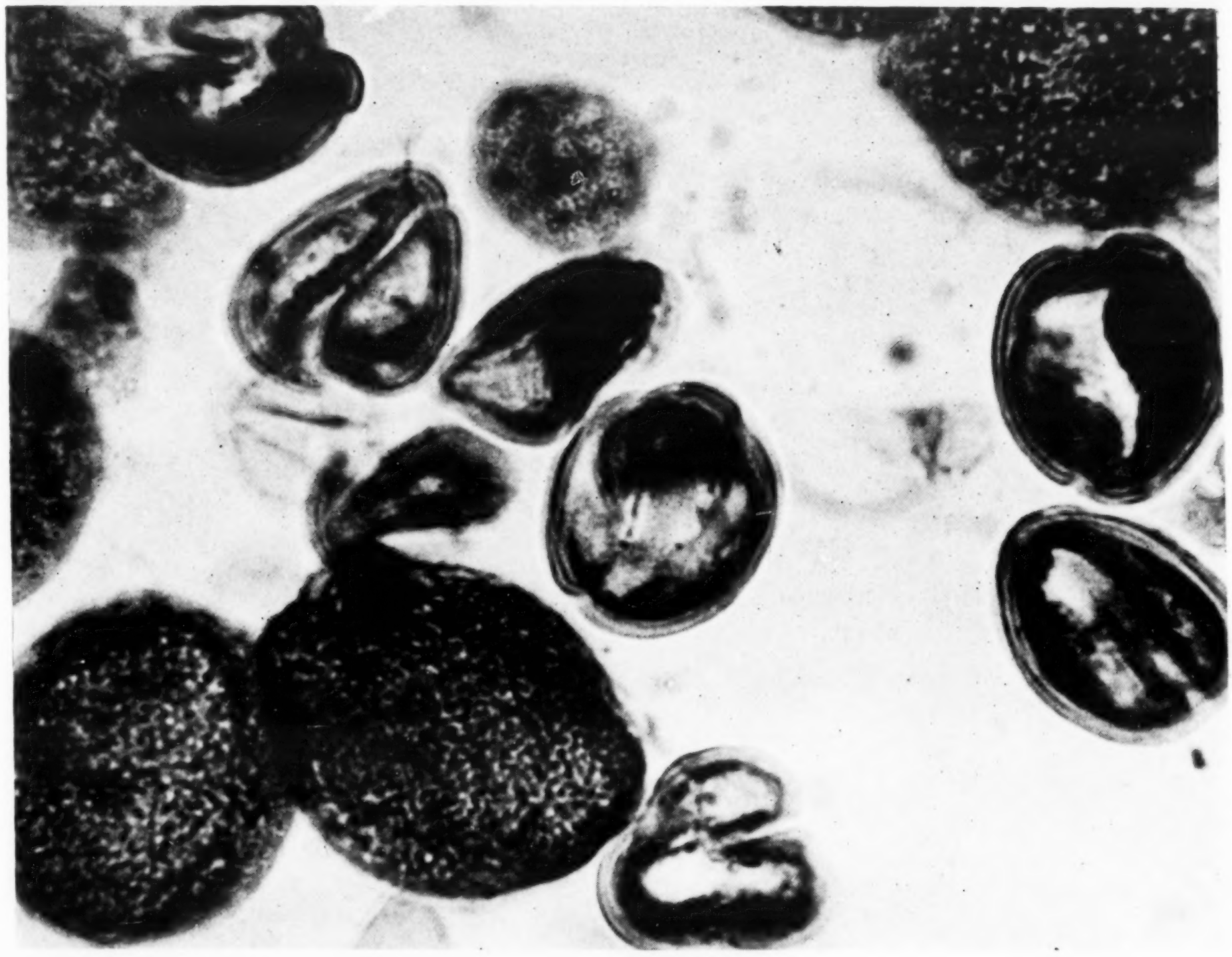
The pollen illustrated in Fig. 9 is here shown still more highly magnified. It will be seen that the empty grains fold up very neatly, their envelopes being provided with creases for that purposes. (Fig. 16.)

of which forty-two were strictly local in their distribution. Red Mountain being in northern central Alabama, I found that in this area, even when I limited the count to those forms which grew in upland woods, there were still thirty different species; and of these thirty, twenty-two were extremely local. Here again in the case of *C. venusta*, we seem to find ideal conditions for natural hybridization combined with a high degree of spore sterility.

In answer to Mr. Brown's question in regard to mutation in this genus, Ashe cites the Pruinosae and Molles groups as showing some indication of its presence. Since the Molles have only one of their species native to Massachusetts, I have made no study of them; but I was able to secure a number of the Pruinosae, and as to pollen sterility they seem to exemplify the conditions of the genus as a whole.

In Gray's Manual (1908) to the Pruinosae are ascribed six species and eight varieties of which all but *C. pruinosa* var. *dissona* and *C. pruinosa* var. *philadelphica* are considered close enough to species to constitute a separate paragraph. Varieties which are placed in this category are thought "so distinct and peculiar that they are not unlikely to establish the claim" and be considered species. In fact this prediction has largely come true; as of these eight varieties, Sargent describes seven as species and only one—var. *dissona*—as a true variety. The results of the investigation of the Pruinosae was as follows:

Sargent	*Gray*	*% of abortion*
C. cognata	var. *latisepala*	75
C. pruinosa	*C. pruinosa*	60
C. robbinsiana	var. *beckwithia*	50
C. deltoides	*C. deltoides*	50
C. fusca	var. *philadelphica*	40
C. conjuncta	var. *conjuncta*	practically pure
Forma dissona	*Forma dissona*	practically pure



CAN THIS BE A GOOD SPECIES?

Pollen grains of *Crataegus cognata*, highly magnified. A few of them are seen to be perfect, while an equal number are quite incapable of germination. If such a condition were found in the pollen of a single species, it might not attract great attention, but when hundreds of species, in the genus Crataegus, are found to have this kind of pollen, the botanist naturally inquires what has happened. (Fig. 17.)

Among the Pruinosae then, we find conditions much the same as in the rest of the genus—a relatively small proportion of the species showing normal pollen and more than half showing pollen markedly abortive. In view of the fact that unusual sterility and an unusual amount of variation are characteristic of hybrid races, the question of mutation among the Crataegi seems to resolve itself into a matter of hybridization; and in fact, this is the conclusion which Mr. Brown reaches even without this important morphological evidence.

In 1908 (1) he crossed the English hawthorn—*C. monogyna*—with the native *C. Brainerdi:* in 1909, he and William Moore made cross pollinations between the majority of the native species with the result that in all cases the fruit set and matured, to all external appearances entirely normal. The theory which he reached as a result of his investigation was that the enormous increase in the species of the genus is due to extensive hybridization since the dense forests have been cleared (2). The irregularity in the number of stamens and pistils, the variation in shape of leaves and color of anthers (from white to dark purple), the occurrence of plants with characteristics of two different species which grow in the near neighborhood, and the occurrence of numerous local species—one of which is peculiar to almost all of the states east of the Mississippi—all these facts in his opinion point to extensive hybridization. No sufficient tests have been

made, however, to prove beyond a doubt whether or not hybrids of Crataegus are stable—circumstantial evidence seems to indicate that they are, but no such extensive experiments in breeding as would be necessary have been attempted on account of the difficulties due to the slow maturation of the plant.

STUDY OF THE ROSE FAMILY

Since Mr. Brown's article in the Bulletin of the Torrey Botanical Club was published, nevertheless, work carried on in the Harvard laboratories under Prof. E. C. Jeffrey by C. S. Hoar on the raspberries, and by Miss R. D. Cole on the roses, and also my own examination of the hawthorns, have revealed among the Rosaceae a large number of hidden or crypthybrids which are constant in their character and which are recognized by systematic botanists as good species, but which may be distinguished from normal species by the sterility of their reproductive cells. These crypthybrids, while they are extremely important from the evolutionary standpoint on account of their enormous variability and the consequent multiplication of species, must nevertheless not be given credit for the origin of species. Although in answer to Mr. Brown's questions Ashe, Beadle and Eggleston appeared to favor the idea that at least some of the new species of Crataegus might be mutants, investigation of the morphological characteristics of the genus backs up Brainerd in his emphasis of the extraordinary tendency towards hybridization among the Rosaceae. I quote what he had to say on the subject (1).

"In Europe the few species [of Crataegus] cross in many ways (Focke's Pflanzen-mischlinge p. 146). I know of many cases which appear to be natural hybrids or local species each quite intermediate between the two supposed parents with which it is associated. The Rosaceae are of all others the most disposed to hybridize. I should expect the same in Crataegus as in Rosa, Rubus, Geum, Amelanchier and Malus. The condition in Crataegus is much like Rubus, Rosa and Viola. The multiplication of even stable forms that may result (in the working out of Mendel's laws) from one pair of parents is astonishing."

To summarize the evidence set forth in this paper, we find among the Crataegi an extraordinary amount of comparatively recent multiplication of forms; we find also, large numbers of local species combined with unusual sterility. Out of the 171 specimens examined only thirty-five could be considered uncontaminated with regard to pollen conditions, while seventy-six showed from 50 to 100% of abortive grains. Sterility partial or complete of the reproductive cells has long been recognized as a characteristic of hybridism; and forms which are ordinarily accepted as species frequently reveal past genetical contamination by pollen infertility. Among the Rosaceae, a family showing an unusually strong tendency to hybridize, examination of the pollen conditions discloses a great number of these hidden hybrids.

The Intricatae on account of their unique position seemed worthy of study in this connection. In the first place they are a relatively new group so closely allied to the Coccineae that they are included in the group as far as they were known to the older systematists. They show a smaller range of distribution both collectively and individually than do the Coccineae; they only occur in localities where there is a possibility of crossing; and they have a degree of sterility unusual even for the genus Crataegus. This seems a suspicious combination of facts. Investigation of the other groups in so far as I could get material, parallels the condition found in these two groups—that among the more widely distributed species the pollen is apt to be good, while in those of more local range the pollen is largely abortive. This evidence is exemplified by *C. venusta*—a form extremely local in its range and growing under circumstances ideal for cross fertilization—which proved to be 75% sterile.

The study of this genus has brought out evidence of both systematic and morphological character to indicate the

wide-spread occurrence of hybridism; and in conclusion I think we must face the fact that among the Crataegi at least extreme variability is linked with extensive hybridization and the consequent multiplication of species, rather than with mutation and the problem of the saltatory origin of species.[3]

[3] The material for this study was collected at the Arnold Arboretum, and I wish to express my thanks to Prof. C. S. Sargent for this courtesy. I am also indebted to Prof. E. C. Jeffrey, in whose laboratory this study was made, for the use of his apparatus as well as for his advice and criticism.

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The Relation of Vigor to Heredity

VIGOR AND HEREDITY, by J. Lewis Bonhote. Pp. 264, illus., price 10*s.* 6*d.* net. London, Adlard & Son and West Newman, 1915.

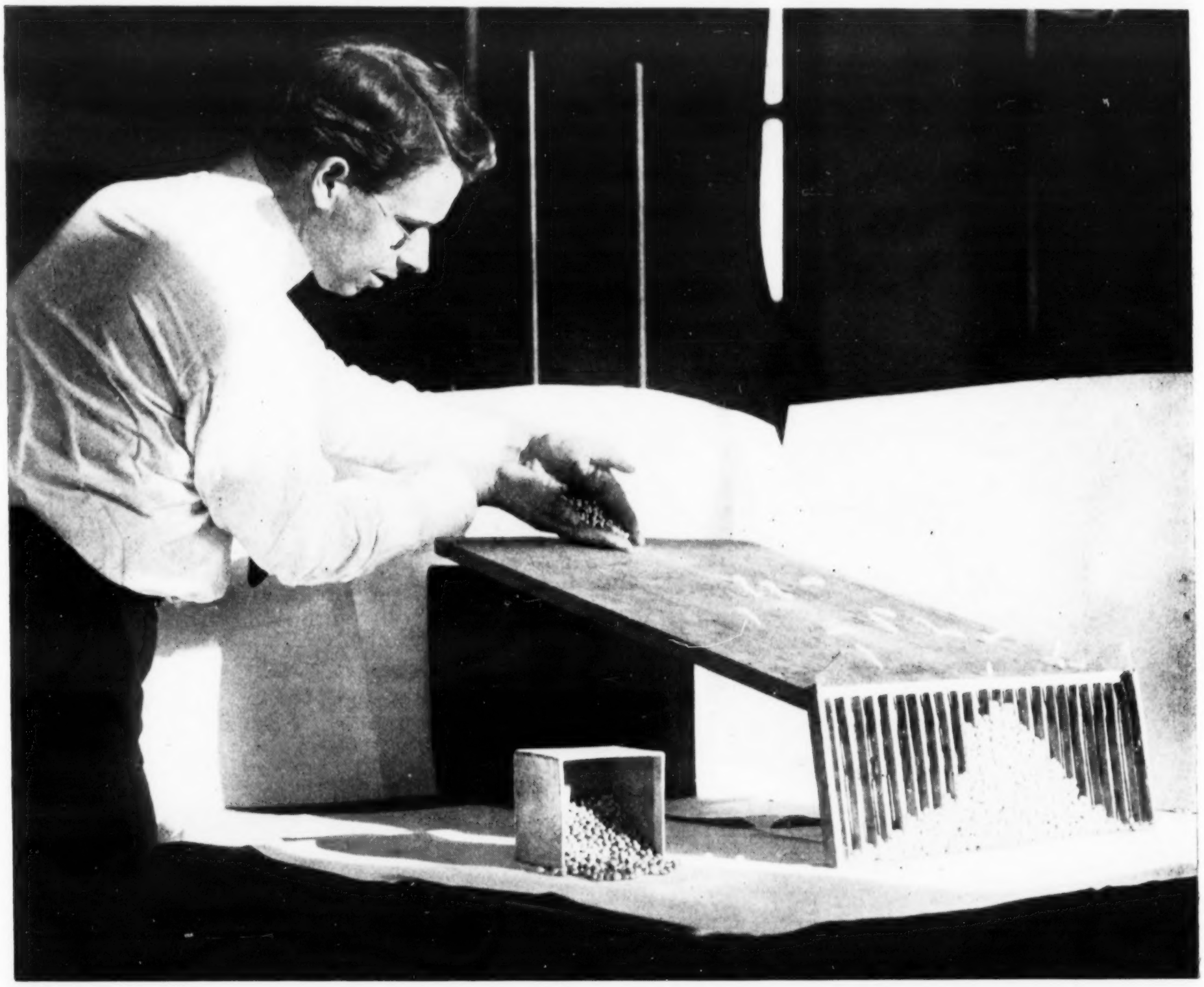
Geneticists have been so carried away with the idea that characters are unchangeable that some of them have given little study to the modifying effects of outside influences on the expression of inherited traits. Mr. Bonhote thinks they have made a fundamental mistake, and asserts that not only is the expression of a Mendelian character—its dominance or lack of dominance, for example—largely dependent on vigor, but that new variations arise from that cause. Furthermore, he believes vigor to be inherited, and has carried on breeding experiments to demonstrate it. His method of measuring an animal's vigor by its color is not the most accurate conceivable, but he draws some highly interesting generalizations from his experiments and from extended observations on species in the wild. His controlled evidence is limited in extent and great weight cannot be placed on it, but the book is at least highly suggestive and ought to lead to a broader view of heredity than is now held by many experimental biologists.

An Elementary Text-Book on Evolution

EVOLUTION, HEREDITY AND EUGENICS, by John Merle Coulter, professor of Botany in the University of Chicago. Pp. 133, illus., price 50 cents. School Science Series No. 5, John Coulter, publisher, Bloomington, Ill., 1916.

"The thinking of today that is most significant is thinking in terms of evolution. Intelligent interpretation of life depends upon it," says Professor Coulter. "Yet it is a fact that the 'average citizen' has but the vaguest ideas of what evolution is." He has therefore undertaken to give definite ideas in a little book adapted for use by high school and college classes in elementary biology. The great extent of ground to be covered necessarily involves a summary and dogmatic method of treatment. The four pages allotted to eugenics are particularly inadequate.

VARIABILITY CURVE FOLLOWING LAW OF CHANCE



Photograph of beans rolling down an inclined plane and accumulating in compartments at the base which are closed in front by glass. The exposure was long enough to cause the moving beans to appear as caterpillar-like objects hopping along the board. If we assume that the irregularity of shape of the beans is such that each may make jumps either toward the right or toward the left in rolling down the board, the laws of chance lead us to expect that in very few cases will these jumps be all in the same direction as indicated by the few beans collected in the compartments at the extreme right and left. Rather the beans will tend to jump in both right and left directions, the most probable condition being that in which the beans make an equal number of jumps to the right and to the left as shown by the large number accumulated in the central compartment. If the board be tilted to one side, the curve of beans would be altered by this one-sided influence. In like fashion a series of factors—either of environment or of heredity—if acting equally in both favorable and unfavorable directions will cause a collection of ears of corn to assume a similar variability curve when classified according to their relative size. Such curves are used by biometricians in classifying and studying variations in plants and animals. Photograph by A. F. Blakeslee, Carnegie Station for Experimental Evolution, Cold Spring Harbor, L. I. (Fig. 18.)

LAUGHING AND CRYING

What Is Their Use?—Probably Safety Valve for the Body When It Is Affected by Emotions—Their Evolutionary Origin

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WHY do you laugh when a man slips on a banana-peel?

Great philosophers have pondered on the problem. Spencer and Bergson have tried to explain it. The latest discussion, and one of interest and lucidity, is that of Dr. George W. Crile.[1] He starts with the assumption that the habit of laughing must be of some use to the race, and then he undertakes to show what this use is.

As a preliminary, we must understand just what we mean, physiologically, by laughter. It is "an involuntary rhythmic contraction of certain respiratory muscles, usually accompanied by certain vocal sounds. It is a motor act of the respiratory apparatus primarily, although if intense it may involve not only the extraordinary muscles of respiration, but most of the muscles of the body. There are many degrees of laughter, from the mere brightening of the eyes, a fleeting smile, tittering and giggling, to hysteric and convulsive laughter. Under certain circumstances, laughter may be so intense and so long-continued that it leads to considerable exhaustion."

"What causes laughter? Good news, high spirits, tickling, hearing and seeing others laugh; droll stories; flashes of wit; passages of humor; averted injury; threatened breach of the conventions; and numerous other causes might be added. It is obvious that laughter may be produced by diverse influences, many of which are so unlike each other that it would seem at first sight improbable that a single general principle underlies all."

If we are to find a general principle, we must proceed from some elementary facts. Man, Dr. Crile tells us, is "essentially a motor being." He is organized for action. The sight of a mad dog, let us say, tends to produce action in the beholder; the body automatically gets ready to run or to fight. These various responses of the body to this situation probably occur before the man himself has realized the situation, and the emotion of fear which is aroused in him results, it is supposed, from the activities of the body in preparing for retreat or defense.

Not only are the brain-cells stimulated by the sight of the mad dog, but the ductless glands at once set to work to pour into the circulation their energizing secretions, thus putting the body in a position to meet the unusual demands made on it. In other words, an emotion (say, fear) is accompanied, or perhaps the result of, the preparation of the body for unusual action. If the action takes place, the fuel which has been released, the sources of energy which have been made available,[2] are used up, and the body returns to its normal condition.

NECESSITY FOR ACTION

But suppose that no action follows the emotion—what happens? The blood is full of "emergency rations," which are not needed and which therefore have to be eliminated as waste products, thus putting a tax on the system. That is why emotion unaccompanied by muscular action, is more injurious to the body than is muscular action alone.

Suppose, then, that one were so impelled to anger that he got in fighting mood, and wanted to hit somebody. He might pursue three courses:

1. He might perform no physical act,

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[1] Crile, George W., "The Origin and Nature of the Emotions." Philadelphia, W. B. Saunders Co., 1915.

[2] "Epinephrin, thyroid and hypophyseal secretions are thrown into the blood streams, while that most available fuel, glycogen, is also mobilized in the blood."

MAN IS NOT THE ONLY PRIMATE WHO LAUGHS

Darwin long ago pointed out that the great apes shared with man the habit of laughing when pleased, or when tickled. The photograph above, from Underwood and Underwood, shows Mike, the clever chimpanzee in the London zoo; Dr. Crile considers that he is laughing although, according to Darwin, the chimpanzee does not ordinarily put so much heart in it, but contents himself with grins and chuckles. (Fig. 19.)

but merely give expression to the emotion of anger. This would, for the reasons pointed out above, be distinctly injurious to him.

2. He might hand his coat to the nearest innocent bystander, roll up his sleeves, and "let go" with the result, if the other man were not too big, that he would completely satisfy his anger and return to normal.

3. He might immediately turn and run around the block, or engage in some other violent exercise. This would consume all the motor-producing elements mobilized by the body and, again, would leave him normal.

It is not proposed, from these statements, to insist on the moral that you should fight every time you get hot under the collar, but merely to point out that when a strong emotion is not followed by some physical action, the body suffers.

Now laughter consists of physical action, of muscular exertion. It serves, Dr. Crile says, "precisely such clarifying purposes as would be served by the gymnastic exercises of an angry man. As it seems to me, the muscular action of laughter clears the system of the energizing substances which have been mobilized in various parts of the body for the performance of other actions.

"If this be true, the first question that presents itself is, 'Why is the respiratory system utilized for such a clarifying purpose? Why do we not laugh with our hands and feet as well?' "

The answer seems to him obvious. Were laughter expressed by the hands the monkey, who shares with man the privilege of a hearty laugh, would fall from the tree. Were it expressed with the feet, a man would either fall down or be temporarily "crippled." The muscles of the face and chest seem to be the most available ones at liberty to perform this action, since they do not incapacitate the subject for any other action that may be useful to him. It may be supposed, then, that in the course of evolution, natural selection has picked out these muscles and fixed on them the duty of relieving a man of the effects of his emotions, by the exercise which we call laughing.

"Let us test this hypothesis by some practical examples. The first is an incident that accidentally occurred in our laboratory during experiments on fear which were performed as follows: A keen, snappy, fox-terrier was completely muzzled by winding a broad strip of adhesive plaster around his jaw so as to include all but the nostrils. When this aggressive little terrier and a rabbit found themselves in close quarters each animal became completely governed by instinct; the rabbit crouched in fear, while the terrier, with all the ancestral assurance of seizing his prey, rushed upon the rabbit, his muzzle always glancing off and his attack ending in awkward failure.

"This experiment was repeated many times and each time provoked the serious-minded scientific visitors who witnessed it to laughter. Why? Because the spectacle of a savage little terrier rushing upon an innocent rabbit as if to mangle it integrated the body of the onlooker with a strong desire to exert muscular action to prevent the cruelty. This integration caused a conversion of the potential energy in the brain-cells into kinetic energy, and there resulted a discharge into the blood-stream of activating internal secretions for the purpose of producing muscular action. Instantly and unexpectedly the danger passed and the preparation for muscular action intended for use in the protection of the rabbit was not needed. This fuel was consumed by the neutral muscular action of laughter, which thus afforded relief.

"A common example of the same nature is that encountered on the street when a pedestrian slips on a banana peel and, just as he is about to tumble, recovers his equilibrium. The onlookers secure relief from the integration to run to his rescue by laughing. On the other hand, should the same pedestrian fall and fracture his skull the motor integration of the onlookers would be consumed by rendering physical assistance—hence there would be no laughter."

THE EFFECT OF A JOKE

Dr. Crile attempts to apply this view to laughter produced by a joke. Jokes, he says, consist of two parts; in the first, the reader's emotion is stirred by the presentation of some situation which seems to call for action, and in the second he is suddenly shown that he has been hoaxed, that it is a false alarm. This element of incongruity has long been recognized as the basis of much humor, and in so far as it is, Dr. Crile's explanation will in many cases cover the resulting laughter. Other cases may be explained as association of ideas. Obviously, however, there must be ramifications of the subject, and some of them were ingeniously explained by Herbert Spencer, whose discussion of laughter is in many ways like that of Dr. Crile, although the latter has the advantage of much work in physiology which has been done since Spencer's time. The philosopher offers[3] this case:

"You are sitting in a theater, absorbed in the progress of an interesting drama. Some climax has been reached which has aroused your sympathies—say, a reconciliation between the hero and heroine, after long and painful misunderstanding. The feelings excited by this scene are not of a kind from which you seek relief; but are, on the contrary, a grateful relief from the painful feelings with which you have witnessed the previous estrangement. Moreover, the sentiments these fictitious personages

[3] Spencer, Herbert, "The Physiology of Laughter." In "Illustrations of Universal Progress" (New York, 1872), p. 203.

TEARS ARE OF GREAT VALUE TO THE RACE

They may not always be appreciated by the individual, or the individual's parents, but historically, according to Dr. Crile, they act as a safety valve for the body, just as laughter does. When a strong emotion is felt, the blood is filled with substances intended to be used in muscular action. If no action follows, the blood is overloaded, and this surplus fuel would have to be eliminated as waste matter, at considerable expense to the system. But either laughing or crying will take the place, to some extent, of more violent physical action, and use up the "emergency ration" which otherwise, to speak figuratively, would cause indigestion. Photograph from the Nursery Studio, Washington, D. C. (Fig. 20.)

have for the moment inspired you with, are not such as would lead you to rejoice in any indignity offered them; but rather, such as would make you resent the indignity. And now, while you are contemplating the reconciliation with a pleasurable sympathy, there appears from behind the scenes a tame kid, which, having stared round at the audience, walks up to the lovers and sniffs at them. You cannot help joining in the roar which greets this *contretemps*. Inexplicable as is this irresistible burst on the hypothesis of a pleasure in escaping from mental restraint; or on the hypothesis of a pleasure from relative increase in self-importance, when witnessing the humiliation of others; it is readily explicable if we consider what, in such a case, must become of the feeling that existed at the moment the incongruity arose. A large mass of emotion had been produced; or, to speak in physiological language, a large portion of the nervous system was in a state of tension. There was also great expectation with respect to the further evolution of the scene—a quantity of vague, nascent thought and emotion, into which the existing quantity of thought and emotion was about to pass.

A DIVERSION OF ENERGY

"Had there been no interruption, the body of new ideas and feelings next excited, would have sufficed to absorb the whole of the liberated nervous energy. But now, this large amount of nervous energy, instead of being allowed to expend itself in producing an equivalent amount of new thoughts and emotions which were nascent, is suddenly checked in its flow. The channels along which the discharge was about to take place, are closed. The new channel opened—that afforded by the appearance and proceedings of the kid—is a small one; the ideas and feelings suggested are not numerous and massive enough to carry off the nervous energy to be expended. The excess must therefore discharge itself in some other direction; and in the way already explained, there results an efflux through the motor nerves to various classes of the muscles, producing the half-convulsive actions we term laughter."

As he goes on to point out, this line of explanation (properly modified in the light of more recent psychology) will explain the fact that, in a group of persons, some will laugh at a given incident and others will not. It is, in some cases at least, because the amount of emotion present varied in the different persons; some required physical action to relieve their feelings; others had no feelings to relieve.

In sum, then, we know that, in emotion, the ductless glands at once pour out an unusual amount of secretions, to prepare the body for an emergency that is supposed to be near. These secretions cannot be recalled; and if the emergency does not bring physical action to use them up, they must be burned up as waste material, at some expense to the bodily mechanism. To obviate this, the muscular activity of laughter has therefore been evolved to use up these surplus fuels, when they are not needed for the purpose for which they were produced; and thus the body is relieved of them without any damage.

"Crying, like laughter," Dr. Crile continues, "is always preceded by a stimulation to some motor action which may or may not be performed. If a mother is anxiously watching the course of a serious illness of her child and if, in caring for it, she is stimulated to the utmost to perform motor acts, she will continue in a state of motor tenseness until the child recovers or dies. If relief is sudden, as in a crisis of pneumonia, and the mother is not exhausted, she will easily laugh; if tired, she may cry. If death occurs, the stimulus to motor acts is suddenly withdrawn and she then cries aloud, and performs many motor acts as a result of the intense stimulus to motor activity which is no longer needed in the physical care of her child. With this clue we can find the explanation of many phenomena. We can understand why laughter and crying are so frequently interchangeable; why they often blend and why either gives a sense of relief."

Laughter and crying, in short, are two forms of the same mechanism—a human safety valve to prevent the results of emotion from injuring the body.

REDFIELD EXPLAINS AND BROADENS HIS OFFER OF $1,000

IN THE JOURNAL OF HEREDITY for February, 1916, was published my offer of $1,000 for data on heredity.

The offer was divided into five parts as follows:

1. An offer of $200 for any intellectually superior person produced by breeding which was more rapid than four generations in a century.

2. Another $200 for any very superior person produced by breeding which was more rapid than three generations in a century.

3. Another $200 for any case of improvement in the work-performing capabilities of any kind of animal which was not preceded by the performance of an unusual amount of work performed before reproducing by the three preceding generations.

4. Another $200 for any case of a decline in work-performing capabilities failing to follow a deficiency of work performed in preceding generations.

5. Another $200 for any group of animals in which the work-performing capabilities of the individuals of which were not proportional to the amount of work performed by their immediate ancestors (three generations) before reproducing.

From a number of letters received it appears that the terms of the offer seem indefinite or ambiguous to many persons. For the benefit of such I am furnishing the following explanations and observations.

The first thing to consider is the distinction between a foot-pound and a cubic foot. Biological teaching has been concerned principally with the class of things measured by the cubic foot or corresponding unit. The offer relates to the class of things measured by the foot-pound or corresponding unit.

A sick man does not hire his physician by the cubic foot. He hires him for his foot-pounds of intelligence. This is not to say that intelligence is ordinarily measured by the foot-pound, but it is to point out that intelligence belongs in that class of things measured by the foot-pound type of unit, and not in the class measured by the cubic foot type.

A horse-power derived from a horse does not differ from a horse-power derived from a steam engine. The result of a mathematical calculation performed by the human intelligence does not differ from the result of the same calculation performed by a calculating machine driven by a motor. Many automatic machines operated by mechanical power perform the identical work performed by the human intelligence and the human hand.

HEAT THE SOURCE OF POWER

A man can move and think only because of heat units derived from food. Shut off the supply of heat units and the animal dies. The germ can exist and go into the reproductive process only because of the heat units it receives. Shut off the heat units and heredity ceases to operate. Heat units are the source of mechanical power.

The above observations are for the purpose of pointing out that human intelligence, and animal powers of all kinds, have the same origin as mechanical power, and are transformable into the same work. Animal energy is identical with mechanical energy.

There are certain laws relating to energy, which laws are definite and precise things in science. My offer raises the question of a conflict between present biological teaching and the presumably indisputable laws of another science. The last three sections of my offer were carefully worded with those laws in mind, and on the assumption that those laws are absolutely rigid for all forms of energy.

All of my writings on this subject,

from 1902 to the present time, have been directed to showing that the energy found in animals is identical with the energy known in mechanics, and responds on test to the laws that govern all other forms of energy known to science. As those laws can operate from one generation to the next only through the inheritance of acquirements, my writings have been directed mainly to that essential and disputed point.

I have published the results of my investigations into some thousands of cases. On many occasions for more than ten years there have been complaints because I did not also give contrary cases, that is, cases which showed that Nature violated her own laws. I have never found any such, but for the benefit of those who think that she actually does do so, there is my offer of $1,000. As stated, the offer requires the evidence to be in a particular form, but I now broaden out the offer by saying that any evidence of any kind or description which will cause the American Genetic Association to declare officially that the known laws of energy are not valid when applied to energy in the living animals, will capture the money.

IS EVOLUTION POSSIBLE?

A parent cannot transmit what he does not have. If he can transmit no more than he inherited, how can there be an evolution (increase) of animal power from generation to generation? If it be assumed that such increases of power capabilities might come by mutation or advantageous variation, then we would have the case of an offspring born with something it did not inherit from its parents. That would mean that an act of special creation had taken place, or that the laws of energy had been violated in some way in the reproductive process. I will again broaden the offer by saying that any evidence of any kind or description which will cause the American Genetic Association officially to declare that the laws of energy can be valid in the living animal from generation to generation and yet not involve the inheritance of acquirements, will capture the money.

In Dynamic Evolution I have given a brief statement of the laws of energy, and the manner of applying them to the energy in animals. For a more comprehensive understanding of energy and the laws relating thereto, reference must be had to text-books on physics, or to those parts of books on mechanics or engineering which treat of power production and power distribution. Reference may also be had to articles on "Energy" and "Energetics" in Encyclopedia Brittanica, last edition. See also "Energy" and "Thermodynamics" in Cyclopedia Americana.

C. L. REDFIELD,
Chicago, Ill.

Left-handedness

The latest contribution to the much-discussed and little understood problem of left-handedness is that of Dr. Franz Schwerz in the *Archiv für Rassen- und Gesellschafts-Biologie*, XI, 3, pp. 299–314. He finds the statistics of its frequency conflicting: Hasse and Dehner, who examined 5,141 German soldiers, found the left-handed to be 1%; Stier's figures for East Prussia are 2.32%, for Würtemburg 6.5%; the author found in 1,072 Schaffhausen school children 7.9%. It is not certain whether the abnormality is more common among boys or girls. Schwerz alludes to the idea that left-handedness is to be classed as one of the "stigmata of degeneracy," and accepts the old belief (now hardly tenable) that in primitive times left-handed and right-handed people existed in equal numbers, and that more right-handed people survived to leave descendants like themselves because in combats with men or wild beasts, fighters who held the shield in the left hand, thus protecting the heart, were more likely to survive.

DYNAMIC EVOLUTION

By CASPER L. REDFIELD

Price $1.50

DYNAMIC EVOLUTION shows that the energy in animals, known as intelligence and physical strength, is identical with the energy known in mechanics, and is governed by the same laws.

$1,000

Have been deposited with the AMERICAN GENETIC ASSOCIATION to be paid out at their discretion if it can be shown that those laws are ever violated in the reproductive process. DYNAMIC EVOLUTION is authority for the meaning of the terms of the offer, the details of which were published in the JOURNAL OF HEREDITY for February, 1916.

G. P. PUTNAM'S SONS

NEW YORK and LONDON

Some English Suggestions for Eugenics

At the Institute of Hygiene (London), Dr. Murray Leslie lectured on "The Disabled Soldier; His Future and His Economic Value." He said that the British casualties in the present war up to February 1, numbered 550,000, whereas the total casualties during the whole of the South African War were under 50,000. These numbers would be greatly increased as the war went on, and it was estimated that for every thousand deaths recorded, there would be 200 cases of permanent disablement. The mere fact of a man's being a cripple, or even deformed, would in no wise detract from his potentialities as one of the fathers of the future generation. The present marriage rate was the highest ever known. Those marriages for the most part, had been confined to young, strong, and active soldiers, although there were numerous instances in which our girls had been only too delighted to marry the men of their choice after they had been disfigured or disabled. Women, as a sex, had an aversion for deformities of all sorts, but that would probably not hold good to anything like the same extent if the young couple had met each other before disfigurement took place. From that point of view war engagements, as well as war marriages, were greatly to be recommended. Admiration for our disabled war heroes should be encouraged. It had been proposed to found a League for the marrying of wounded heroes. It was doubtful if such a scheme could be made a practical one, but there was much to be said for the principle. The economic question was the difficulty, yet how many women there were in this country with comfortable incomes who spent large sums on pampered lapdogs.—London correspondence of the *Journal of the American Medical Association*, May 6, 1916.

Genetics Literature

THE annual reports of the AMERICAN BREEDERS' ASSOCIATION, published in seven volumes, form the most valuable collection of material for students of genetics which has been published in the United States. Most of them are out of print and are becoming very valuable. All of them are nearly indispensable to libraries, institutions and students of plant and animal breeding, heredity, variation, eugenics, or genetics in general.

The Association still has on hand a limited number of copies of three of these reports, which it offers for sale.

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